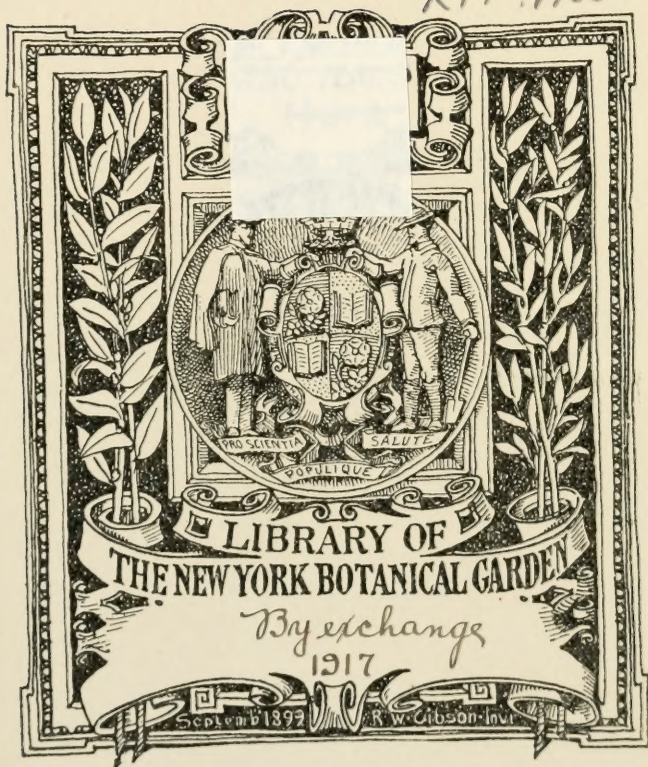


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No. 1.

INDEX FOR VOLUME VIII.

With this number is issued the table of contents and index of Volume VIII of The Hawaiian Forester and Agriculturist. We flatter ourselves that the plan adopted is an improvement on the index of Volume VII. The object sought, and we believe gained, was to secure the minimum of effort to find any particular thing wanted in the volume. Minutes of the board and reports of divisions are sub-indexed to show every important topic contained therein. Similarly contributed articles, reports of the conservation meeting and the rubber growers' convention, and even selected articles of varied scope, are sub-indexed. Editorial matter is indexed both as to headed articles and independent paragraphs. Besides the indexing of subjects in board minutes and division reports, incidental references to board or division elsewhere are indicated under the head of government bodies.

As to the subject-matter analyzed in the index, it is evident that the magazine has covered a wider field, the past year, than ever before in its eight years of existence. Besides being a record of the activities of the Board of Agriculture and Forestry, it has been made an organ of the educational department of the Territory, although in a different way. During the year considerable information relating to the College of Hawaii, much of it didactic for the benefit of both teachers and students in all schools, has been given in the pages of the magazine. Most of such matter has borne upon nature study in the public schools and farm and garden science. The proposed course of study for the public schools is elaborated in the latter part of the volume. Another valuable feature of the Forester for 1911, although not so fully developed as the editor desired, is that of the technical articles contributed by specialists, such as Messrs. Hagens and James, which cannot possibly have failed to yield benefit to culturists in our diversified agricultural industries. To supplement such original contributions, the exchanges have been diligently searched for useful information on tropical agriculture.

That the entire bill of fare has been varied is somewhat evidenced by the fact that the volume just closed contains an aver-

age of more than twelve headed articles each number. The great variety of topics treated, one way or another, is shown by the index. A special effort will be made this year, with the kind assistance and counsel of the agricultural and educational chiefs and divisional lieutenants, to make the Forester and Agriculturist worthy of the advancement in both those lines which the Territory is today showing.

THE FRUIT FLY CAMPAIGN.

Nothing could be more reassuring to the general agricultural interests of the Territory than the promptness and energy with which the Board of Agriculture and Forestry has brought into play the powers the legislature of 1911 conferred upon it, both of authority and of finances, to combat the ascendancy of the Mediterranean fruit fly. Already the Forester has congratulated the board upon securing the services of W. M. Giffard, through his acceptance of honorary membership of the entomology committee, as director of the campaign against this destructive pest. That no mistake was made in this appointment has evidence already in the businesslike report, both of plan and progress, which Mr. Giffard has made as appears elsewhere. With the assistance of the California commission of agriculture, backed by a substantial money contribution from that State, there is every reason to hope that the time is not distant when the pest will be well controlled here—just as well as the sugar planters have reduced to a minimum the destructive activity of the cane leafhopper.

The menace of complete destruction by the Mediterranean fruit fly of a large proportion of the Hawaiian fruit industry, just as it seemed to be on the eve of great expansion, will not have been an unmixed ill if it result in the enforcement of clean culture upon horticulturists of all nationalities in these islands. That this happy end will be gained has much promise from the energy with which it is being pursued by Messrs. Ehrhorn, Starrett and Giffard.

Three numbers of rules and regulations lately adopted by the Board of Agriculture, with the Governor's approval, all relating to the suppression of pests, are officially published in this issue. All growers of fruits and vegetables will be wise to heed them.

Anyway, there is little fear that dogs quarantined against rabies will be any the worse for detention the required period. The anxiety of the Territorial veterinarian to preserve the canine realm of Hawaii from such dire infection is an earnest that he will not allow the strangers to be abused in quarantine. Properly conducted quarantine kennels ought to be a good place for acclimating the alien dog.

SIX-FOOTED PUBLIC QUESTIONS.

Some of the Inter-relations between Insects and the Community.

(An illustrated address delivered before the Public Questions Club of Honolulu, Nov. 7, 1911.)

It is my purpose this evening, in addressing the Public Questions Club, to briefly indicate a few of the innumerable relationships that exist between the social community and that marvelous group of creatures which we know as insects. This may be considered as the introduction to a detailed discussion of our insect problems, which I hope will follow this paper. Some lantern illustrations will aid in elucidating such matters as life-histories, coloration, and structural details.

One need not apologize in presenting insects as a public question. Indeed, they have already intruded themselves as such. The yellow fever mosquito, the Mediterranean fruit fly, and others have been prominent subjects of conversation and comment, over the coffee cups as well as in the office. They have extended their range from the narrow confines of technical treatises and experiment station bulletins, and now array themselves in the conspicuous places of the daily press, and journey by cablegram from Washington and back again.

Insects have always been a public question. Time was, when man lived in a cave, wore a bear-skin, and carried a stone club, that certain insects constituted a very personal and painful question, nearer than clothes, and shed with much more difficulty. Perhaps one of man's first asseverations of his dominion over nature was his freeing of his body from various insect pests. These, having chosen external regions of his person as their habitat, could be easily eradicated by means of personal cleanliness. It is a striking commentary on the progress of the human race as a whole to note that a very large portion of the human race has not yet attained even this low stage of comfortable existence.

As an "aside" it may be said that civilized man himself is just upon the threshold of realization of the enormous battle ahead if he would wholly free himself of the devastating ravages of those microscopic plants called bacteria, which may frequent all parts of his natural anatomy.

To return to insects, we are now entering the era of social consciousness wherein it is realized that insects are no longer personal problems. They can be fought successfully only through commercial method. The boy with pediculosis (which is merely the polite scientific way of saying fleas), has no right to infect a school room; the dairyman and the butcher dare not permit the filthy house-fly, which is engendered in dung, and which carries typhoid, to pollute their wares; Mr. Blank is not acting fairly

when the undrained pools upon his land breed mosquitoes that range the neighborhood.

An insect whose life-cycle excellently illustrates this necessity for community labor is the peach-tree borer. The adult of this pest is a pretty little moth, the females having bluish wings and an orange band on the abdomen, the males having clear wings and no orange band. The eggs are laid on the bark of peach trees, near the ground. When highly magnified they show beautiful reticulate markings, as do the eggs of many insects. The larvae or "grubs" bore into the bark, and throughout the wood, forming long winding tunnels, and greatly injuring or killing the tree. When mature the grub forms a cocoon near the surface of the ground, and changes into the pupa from which the adult emerges. Trees infested by these borers can be recognized by the large masses of gummy exudation around the base of the tree.

There are various devices for protecting the trees from the attacks of this pest. Coverings of tarred paper, wire and wood-veneer have been tried with varying success, the idea being to prevent the female from laying eggs on the tree. In an experimental orchard it was found that deterrent sprays sometimes kill the trees.

Fighting the peach-tree borer means, then, that all persons owning peach trees must enter into the campaign. Otherwise a single unguarded tree may supply a large region.

The cabbage-worms also illustrate the need for "team work." The white butterflies are well known to every countryman. The eggs are laid on the cabbage leaves. These are delicately sculptured. The larvae devote their entire time and energy to the devouring of cabbage foliage, and if they are numerous the cabbage naturally succumbs. Fortunately the caterpillars are subject to the attacks of a fatal bacterial disease, which aids in holding them in check. They have also a number of parasitic enemies, who decimate their ranks. When mature the caterpillar suspends itself by means of a silken button and girdle and transforms to a protectively colored and quiescent chrysalis, from which emerges the adult. To eradicate the cabbage-worms of a given region obviously demands the coöperation of all the cabbage growers of that region, else a single untended patch will become the breeding grounds for the whole region.

Man is aided in his combat against destructive insects by the fact that many insects are predaceous, feeding upon other insects. Dragon flies, which feed upon mosquitoes, and mud-wasps, which fill their nests with spiders, are well known examples of this class. Perhaps one of the most remarkable of these predaceous insects is the praying mantis. This strange creature is so-called because of its hypocritical attitude of pious harmlessness, the highly specialized front legs being, in reality, powerful grasping organs, wherewith the wolf in sheep's clothing seizes its helpless prey. The eggs are laid in curious masses, whose tops have the appear-

ance of being braided. The young hatch almost simultaneously from the egg-mass, and crawl away, leaving behind their cast-off nymphal skins.

Other insects render service to man by destroying weeds and other noxious plants, the milkweed caterpillar being one of this sort. The adult is a brown butterfly common in many meadowlands. The caterpillar is distinguished by its bold black, white and yellow bands. When full grown the caterpillar suspends itself by means of a button of silk and transforms to the chrysalis from which in due season the adult butterfly emerges. It is interesting to note that the milkweed butterfly has a flavor noxious to birds, and is therefore not devoured by them. Another butterfly of an entirely different family, and lacking any noxious protective flavor, has assumed the protective coloration of the milkweed butterfly. It is a neat instance of mimicry.

A fourth group of insects are those whose larvae feed upon plants that are not of economic importance. The *Cecropia* moth, found throughout the United States mainland, is of this class. The eggs are deposited upon the leaves of various forest trees. The caterpillars are rarely injuriously abundant. They are remarkable for their defensive armor of bristle-covered tubercles, which persist in all the varied molts through which they pass. Before the final molt a cocoon is spun, and within the finished cocoon the pupal stage is assumed. The *Cecropia* pupa is so large that the various parts of the adult which is to come from it can be readily distinguished.

This silk-producing habit of caterpillars is commercially utilized, as is well known, in the case of the silk-worm. The moths of this species are reared in captivity, and the eggs are given great care and are artificially incubated. The young silk-worms are fed and tended by experts. When they attain full size they spin the familiar cocoon of commerce. The cocoon contains, of course, the pupa, which is killed by immersion in hot water. This process also loosens the thread, which is then reeled. The adults are permitted to emerge from certain cocoons and are kept for egg-laying.

The Caveman freed himself from vermin with greater ease than he did his lair. The lair problem is one that exists into this day. The festive roach is a question that we would not make public. There are a large number of species of roaches, varying greatly in appearance, but if you hit any one of them too hard with a newspaper it will leave a spot on the wall-paper!

A still more delicate problem is that of the ancient disturber of Morpheus, the bed-bug. When magnification reveals his corpulence and armor, our animosity suffers no decrease, but rather increases proportionally. The various pests that attack foodstuffs gain nothing in attractiveness by magnification, although this process reveals how admirably they are fitted to carry on their destructive work. The termites or "borers" that riddle our wood-

work, especially koa and similar hard-grained and non-resinous woods, are household problems that can best be fought along household lines.

It is pleasant to turn from the consideration of these small, destructive, inartistic vermin to the large and beautifully colored representatives of the six-footed folk. These are the winged jewels of the insect world. The variety of color-patterns and color-tones is well-nigh infinite. These frail creatures of the air are not to be considered as public questions in any inimical sense, but as public property. They deserve our attention because of their intrinsic loveliness, knowledge of the fascinating cycles of their lives and of their place in the great world of Nature should be the common property of every school-child.

VAUGHAN MACCAUGHEY.

The College of Hawaii.

CLEAN CULTURE.

This was the topic for discussion at the first meeting, November 9, of the season of the Agricultural Seminar. A lucid and succinct presentation of the subject was made by Supt. E. M. Ehrhorn, which is printed in full elsewhere.

This paper was followed by general discussion, of special note being the remarks by Mr. Giffard regarding the relation of clean culture to the control of the Mediterranean fruit fly. Dr. Wilcox discussed the striking relationships between clean culture and the control of the cotton boll worm. Notice was also called to clean culture as a part of the present mosquito campaign. The value and importance of clean culture methods, as supplementing such methods as parasites and sprays in the control of insects, was commented upon.

The meeting was held at the College of Hawaii, and was well attended. It should be stated that these meetings are open to all men who are interested in agriculture or related sciences.

VAUGHAN MACCAUGHEY, Secretary.

Supervisor Low has from his official seat expressed the opinion that there is no menace of rabbits, his reason being that the animal thrived greatly at Niihau many years ago but never spread from that spot. Perhaps they never emerged from the little oasis in a wilderness of rocks and wilted scrub because it was impossible for them to eat their way out to cultivated areas through miles of such existing barriers. Even more certain would be the impossibility of fighting their way out, considering the gauntlet of fierce dogs and mongoose Bunny would have to run. There are enough vagrant dogs around the strategic point of the Kai-muki car terminus to chew up the entire rabbit pest of California were it transplanted thither.

CLEAN CULTURAL PRACTICE METHOD FOR FIGHTING INSECT PESTS.

BY EDW. M. EHRLHORN.

In the course of the ages through which our world has existed, there has been gradually established, by the influence of surroundings, a certain ratio between animals and plants. There is a continuous struggle going on among the plants themselves as well as a struggle between the plants and insects. This has been more generally observed where nature's influence has been upset, making surroundings as it were unnatural. Extensive plantings of one plant or other has created abundance of food which very soon is eagerly sought by various enemies, either fungi or insects, and nature is unable under such conditions to hold her balance.

From the time that man began to cultivate, his crops have been attacked by some pests, be it vegetable (fungi) or animal (insect pest) and we find in some of the oldest books on gardening and entomology how the early farmer and horticulturist had certain remedies to combat the enemies of his crops with. Many of these were rather queer in their composition. I remember reading of a remedy which was used in the Southern States consisting of lime, soap and whisky.

Within the last decade great strides have been made in fighting pests but it is not my intention today to dwell on insecticides and their uses, nor on parasites and predaceous enemies of our pests, nor on the great benefits which have been derived from such methods. I am going to draw attention to a method which I am sorry to say is but little known in these Islands and which, if taken up by the various growers, will do much to check the ravages now caused by various pests. I draw your attention to the practice of clean culture. Cleanliness on a farm, in a field or in a garden means much to the crops or to plants and much toward the reduction of pests. Why? Clean culture means cleanliness; the destruction of weeds, the removal of crop remnants as soon as the crop is done; picking up and destroying dropped fruit, removing, burning up, or otherwise destroying all rubbish that cumbars the ground. Experience has shown that many of our pests are protected by these very materials which we should get rid of.

Take our melon fly as an example. This pest has been in the Islands over twenty years and it is today one of the worst pests we have. It is next to impossible to raise cucumbers, melons or squash and only by covering over these is the grower rewarded by being able to raise a few inferior melons. Why is this so? Anybody can go into the outskirts of Honolulu and he will sometimes see fields of cucumbers, melons and the like lying about the ground and if he should take the time and examine a few he would find them decayed and alive with maggots, a large per cent. being those of the melon fly. What if clean cultural practice were en-

ployed, the gathering up and destroying of all such rotten, infested produce? Sometime ago I cut a small piece of a water melon from one found in a field and placed it in one of my breeding jars. From that piece, about 3 inches square, I bred 109 melon flies, not counting a large number of decay flies which also issued from it. I have often wondered how many flies could have been bred from the melon and how many flies would have bred from the field on which were many hundreds of melons. Would clean cultural practice pay in a case like this one? It surely would, and on account of the habits of the insect, clean cultural practice would be the only profitable way of coping with the pest. I mentioned the destruction of weeds as pertaining to clean cultural methods. Many fields after being planted to various vegetables are allowed to grow up in weeds and the crops usually are of inferior quality. Not only that but certain pests are attracted to the weeds and also find good food on the growing crop. After the crop is harvested the rubbish and weeds are usually allowed to remain for some time and many insects collect and hibernate in the tangled mass, patiently waiting for the next planting to be made. Now that the Mediterranean fruit fly is with us we can readily see that the practice of clean culture, the collecting and destroying of all infested fruit will do much toward checking this pest. In fact I have already met several who have started this method and they have reported improvement in their crop conditions.

In a vegetable garden not long ago I saw a lot of old cabbage plants, the remnants of the crop. The heads had been cut out and the stump left and new growth had started and these plants were completely covered with the cabbage aphid and nearby the ground had been prepared for another cabbage crop. Now if the plants had been pulled up and destroyed, the breeding place for the aphid would not exist, and the newly planted crop would be, practically speaking, free from the pest.

We very often see a grower plant a piece of land which was covered with healthy weeds and at once start to plant all kinds of small crops in the field. The seeds sprout and suddenly disappear and Mr. Grower can't understand what is killing the plants. He calls in the Bugman, who shows him some fine fat cutworms. Nature had provided a feast of weeds for this pest, but Mr. Grower destroyed the food and planted new food. Had he any knowledge of clean culture methods he would not have allowed these weeds to grow long enough to attract the cutworm; also, he should have plowed the weeds under several weeks before planting his crop, so as to starve the cutworms or prevent their development.

No matter where we go or where we look we find some cause for all the trouble with our fruits, plants or vegetables. The other day a shipper received word from the Coast that his bananas had to be fumigated on account of scale insects. He said: "Just think of it, bananas infested with scale, never heard of such a thing before, thought that only trees could be infested with scale."

Well, he wanted me to go and take a look at the plantation. I told him that I knew of three species of scale insects infesting the banana plant and fruit and that we would probably find the plantation badly infested, if the scale had been found plentiful on the fruit. Just as I had expected, the plants, in fact the whole grove, was in a terrible condition. Old stumps had been left standing, the dry leaves were hanging over the old and new growth and were all badly infested with scale insects, which, as the leaves dried up, readily crawled to the new leaves and to the forming bunches. The existing condition was absolutely unnecessary and the chances of re-establishing a clean plantation by the application of clean cultural methods should be a very easy task, but it must be done on a thoroughly systematized plan.

To illustrate how important clean cultural methods are, I may mention that the cotton growers, who, under ordinary conditions lose from 50% to 75% of the cotton crop, owing to the serious attack of the cotton boll worm (*Celechia gossypiella*), can and have proved, that by collecting the affected bolls, or on a larger scale, by pruning the cotton plants, removing all infested bolls and the late stragglers which generally harbor the cotton worm, the pest can be reduced to a very small percentage.

Clean cultural methods, when carried out in conjunction with spraying or if carried on where the natural enemies of the various pests abound, always show a decided improvement owing to the action of two or three factors working together, but clean cultural methods alone will do much toward a very good check on some of our worst pests. The old saying, "An ounce of prevention is worth a pound of cure," is as applicable to man in relation to insects or fungi which injure his crops as to other matters which affect his well being. The enterprising grower who employs practical methods for the control of insect-pests which menace his crops has a distinct advantage over one who does not. He is enabled to obtain a good yield while the careless grower only gets loss and disappointment. Eternal vigilance is the price of a good crop, especially in a country where the summer season always prevails.

Coöperation in the control of pests is another feature of success and should be instituted on business lines. The greatest damage to a thrifty farmer or grower is very often caused by his negligent and indifferent neighbor. It does not seem just to the clean culture grower that his next door neighbor should be allowed to breed all kinds of pests which soon find their way to his clean farm, and it is not just and should be remedied. The careless banana grower should not be allowed to produce scale infested fruit which when sent to the outside market is held up, fumigated and condemned, and will, if such infested fruit is permitted to be shipped, probably stop a good and paying industry. Steps should be taken to protect the industrious, clean culture practicing grower by regulations which can be used to make those who do not protect their own crops abate their nuisance and thereby check the promiscuous breeding of all kinds of pests.

THE "AIR-PLANT," *BRYOPHYLLUM*.

AN INTERESTING PLANT OF HAWAII.

VAUGHAN MACCAUGHEY, *The College of Hawaii*.

Hawaii can boast of many unique plants. There is perhaps no region of similar area in the world whose flora is so rich in peculiar forms. The "air-plant" or *Bryophyllum*, well-known to many people, but unknown to a still greater number, is a plant, found in these islands, that has many curious and remarkable points of interest.

The plants of the Hawaiian Islands may be grouped in two great classes,—first, those that are native or endemic to these islands; and second, those that have been introduced through human agencies. To the first class belong such plants as the koa, kauila, maile, bird's-nest fern, etc.; to the latter, such forms as the taro, breadfruit, banana, sweet potato, and a host of other useful and ornamental plants.

The air-plant belongs to this latter group. It is of comparatively recent introduction, but has been carried to several of the islands. In Hawaii it is common in portions of the Kau lava flows, and along the Kona road. On Oahu it occurs in abundance along the roadsides near the Nuuanu Pali. It forms a conspicuous part of the undergrowth in the eucalyptus forest on Tantalus, and is found in various waste-places in the vicinity of Honolulu (Fig. 1). It doubtless occurs on the other large islands of the group.

The special claim of the air-plant to our interest is its peculiar ability to form new plants along the margins of its leaves (Fig. 2). The leaves are arranged oppositely upon the stem, and thus appear to be in pairs (Figs. 1, 4). This is a marked contrast to the leaf-arrangement of such a plant as hala or papaia, whose leaves are arranged in spirals or whorls; or that of such plants as sugar cane or bamboo, whose leaves are arranged alternately, each leaf being half-way around the stem from the one immediately adjacent to it.

The leaf itself is either simple in outline, or is sometimes divided into several (usually three) large leaflets, the terminal one being larger than the others. The leaf is oval in shape, and thick and fleshy in texture (Figs. 3, 4). Due to the succulency of the leaf its veins are indistinct, being more or less imbedded in the fleshy tissues of the blade. A short, fleshy petiole attaches the leaf-blade to the stem.

The margin of the leaf is scalloped or crenate, and it is from these notches or serrations that the little plants develop. In each notch on the margin of a mature leaf there is a group of

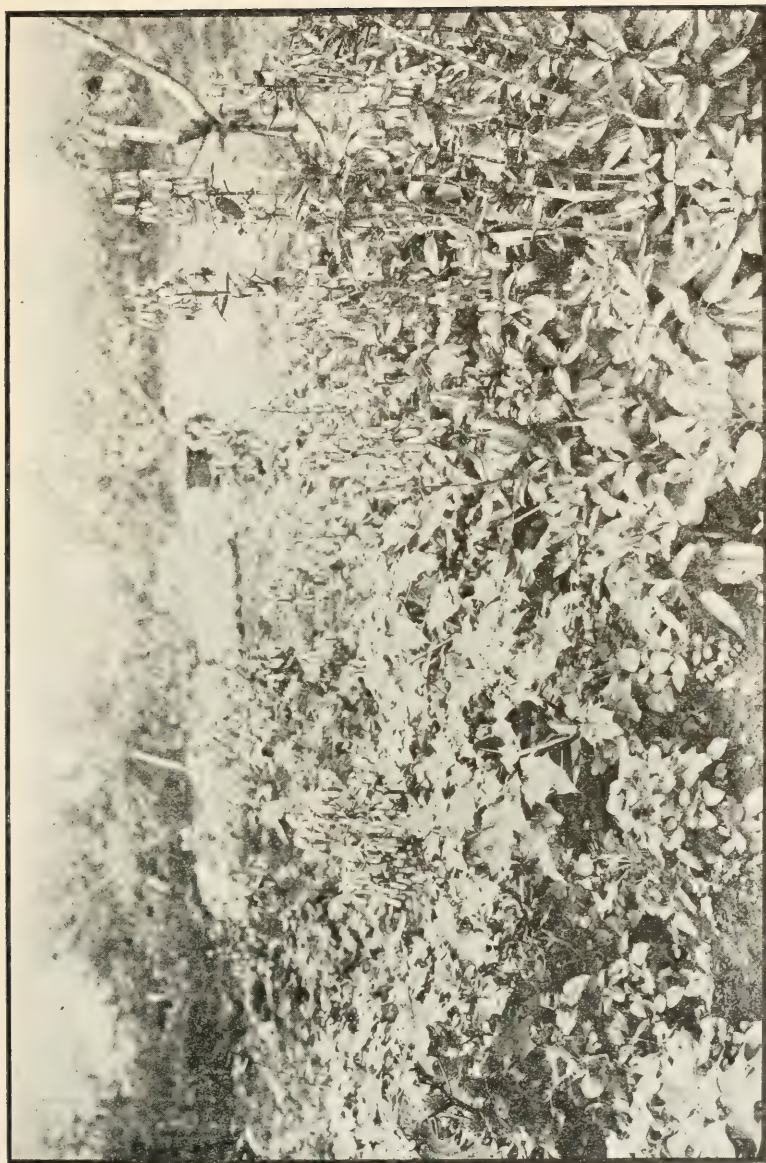


FIG. 1.

Clump of *Bryophyllum* plants. Note the characteristic foliage, and flowering stems. The plants towards the left side of the picture are "*Jimson Weeds*" (*Datura*).

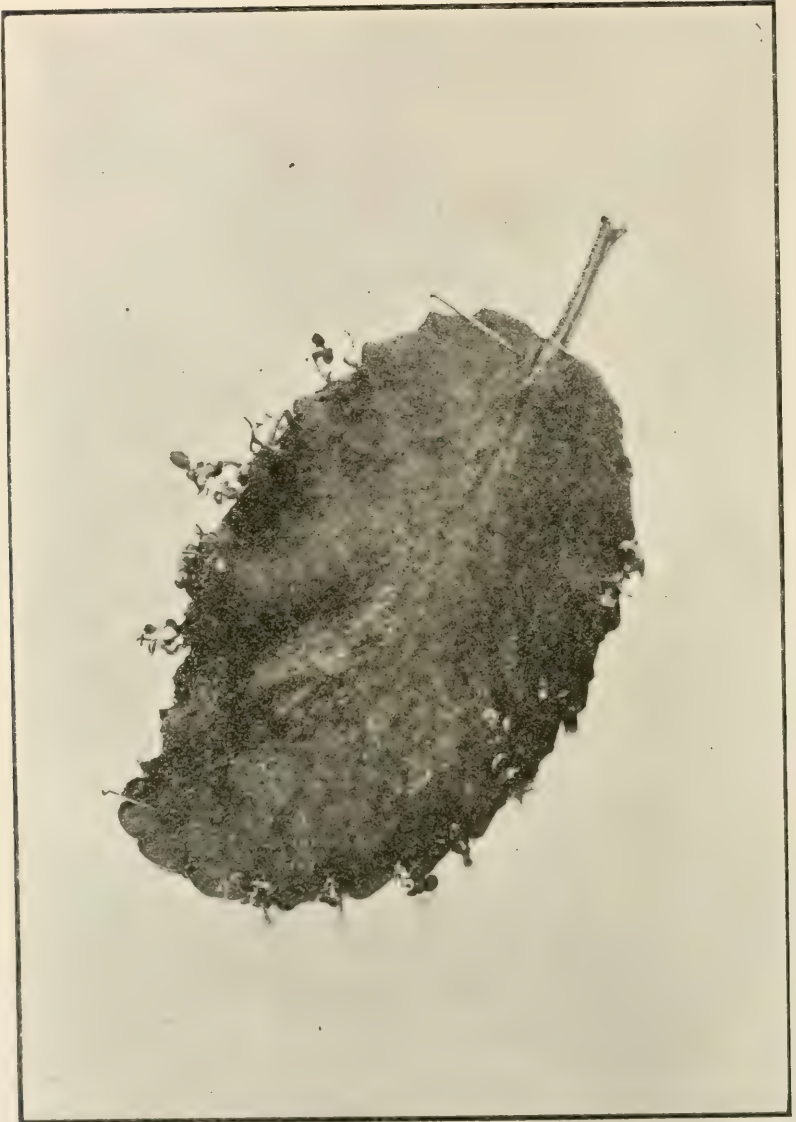


FIG. 2.

Leaf of Bryophyllum.

This leaf had been pinned to the wall. Note the little plants that developed in the notches of the leaf.

cells, which constitute embryonic tissues. These cell-groups can be seen, as small dark dots, with the unaided eye, and are rendered quite distinct by the use of a simple lens. So long as the leaf remains upon the stem, there is usually no further development of these cell-groups. If, however, the leaf be plucked off, or drops of its own accord to the ground, an active process of cell-growth and multiplication takes place in these embryonic tissues, resulting in the formation of little plants, with stems, leaves and roots (Figs. 2, 3).

The mature leaves of the air-plant are so thick and fleshy, and contain such an abundance of reserve material and water that it is not necessary for the leaf to obtain any nutriment from outside sources, in the formation of these new plants. For this reason a leaf may be pinned up on the wall (Fig. 2), and this remarkable reproduction will take place, the parent leaf sustaining the little one for some time until they die. Under natural conditions the leaves drop down onto the ground and the young plants quickly strike root (Fig. 3).



FIG. 3.

Leaf of *Bryophyllum*.

Showing the development of little plants from the leaf under natural conditions, the leaf having dropped into the soil. (From Bailey—Cycl. Amer. Hort.).

This remarkable ability of the leaves to produce new plants without being planted in the soil, (as is necessary in the case of begonia leaves, which will also produce new plants, though in a somewhat different manner), has given to the plant the name of "air-plant." Its botanic name is *Bryophyllum*, which is derived from two Greek words meaning "sprouting leaf." The species occurring in the Hawaiian Islands is *Bryophyllum calycinum*, originally a native of Africa, but now distributed throughout the tropical world. This species is also known, in botanical books, as *Kalanchoe pinnata*, and *Cotyledon rhizophylla*. There are three other kinds of *Bryophyllum*, one occurring only in the Cape region of Africa, and two confined to Madagascar. The great German poet-philosopher-naturalist Goethe was much in-

terested in *Bryophyllum*, and mentions it repeatedly in his writings.

Another curious fact concerning the leaves of *Bryophyllum* is that they "are sour in the morning, tasteless at noon, and somewhat bitter towards evening. This change has been attributed to the absorption of oxygen at night and its disengagement in daylight."—W. Miller. In India the leaves are used by the natives for various medicinal purposes. They are slightly toasted and applied to wounds, bruises, boils, and the bites of venomous insects. They are also applied as a poultice to contused wounds, this treatment preventing the swelling and discoloration, and aiding the cut parts to unite rapidly.

The air-plant is a tall erect herb. The stem often branches at the base and is more or less shrubby (Fig. 1). It is reddish in color, with raised, oblong, whitish spots. Although soft and herbaceous in texture, the air-plant is perennial, its life extending throughout an indefinite number of seasons.

One of the striking characteristics of the air-plant is the succulency of its tissues. Certain plants store up in their tissues large quantities of woody matter, and these woody plants are termed trees or shrubs. The great majority of plants do not develop woody tissue in appreciable quantities. This type comprises all of the ordinary herbaceous vegetation. A third type of plant body is the succulent type, characterized by fleshy tissues and large amounts of stored water. These plants are usually adapted for existence in dry or arid regions, indeed, this enormous water-storage power is one of their adaptations to resist drought. To this class belong such plants as the air-plant, sisal, and the various forms of cactus.

Another drought-resistant adaptation of these plants is the nature of their skin, or epidermis. It is easy to understand that either a woolly or hairy covering, (the denser the better), or a layer of wax would be efficacious in preventing the undue evaporation of water from the plant's tissues. Such plants as the air-plant, sisal, and cactus have remarkably smooth waxy skins. (Fig. 4.)

The *Bryophyllum* flowers are in large, spreading clusters, the branches of the cluster being arranged oppositely, in pairs. The flowering stem is erect, and cylindrical in cross-section, (the leafy stems are frequently angular), and is spotted with dark purple.

The flowers themselves are $1\frac{1}{2}$ -2 inches long. They are pendulous or inverted in position, and sway gently in the breeze like fairy bells. The outer layer or calyx is greenish in color, striped with purple at the base. In shape the calyx is like an inflated cylindric bag, $1-1\frac{1}{2}$ inches long, and divided at the open end into four lobes (Fig. 5). Projecting beyond the calyx lobes of a mature flower are the bright reddish-purple lobes of the corolla, which form a cylindric bag within the calyx. The



FIG. 4.
Flowers and Leaves of *Bryophyllum*.
Note the fleshy nature of the leaves, and the pendulous arrangement of the flowers.

corolla lobes are sharply pointed, and spread outward. That portion of the corolla which is hidden within the calyx is green in color.

Within the corolla are four pistils, (the seed-producing organs), and eight stamens, (the pollen-producing organs). The pistils are either entirely separate from one another, or are somewhat joined together at their bases. Each pistil consists of three parts,—1, a basal enlarged portion, the ovary, which contains the numerous ovules or unfertilized seeds; 2, a long slender portion, the style, which connects the ovary with (3), the stigma, which is borne on the end of the style, and which is more or less hairy, to receive the pollen. The pollen grain falls upon the stigma, grows down through the hollow style, and fertilizes an ovule in the ovary.

The eight stamens, in two rows of four each, are fastened on the inside of the middle portion of the corolla, and are just long enough to protrude slightly beyond the corolla. Each



FIG. 5.

Flower of *Bryophyllum*.

Showing a bud, an opened flower, and a withered flower.

(From Bailey—(Vel. Amer. Hort.)

pistil develops into a slender pod, that splits open along one side to permit the escape of the many seeds within.

Because of its simple and plentiful mode of vegetative reproduction, the air-plant is easy to propagate and raise. It will grow on almost any soil, and requires practically no attention. It is especially useful for bedding effects among rockery or around the foundations of houses. Although it will grow in comparatively heavy shade, it thrives best in a sunny locality. When once started the plant will propagate itself by means of its fallen leaves, thus constantly increasing the area covered. Its large size and habit of spreading render it unsuitable for planting in pots or boxes.

Its sturdy character and rapid growth should commend the air-plant for more general use as an ornamental plant, and its curious habits should attract those who are interested in the plant-life of Hawaii.

NOTES ON SOME HONOLULU PALMS. I.

VAUGHAN MACCAUGHEY, *The College of Hawaii.*

THE CANE PALMS—BACULARIA.

This group of palms is so called because of the resemblance of their stems to canes or walking-sticks; these latter being some-



The Cane Palm.

times manufactured from the slender and symmetrically marked trunks. The Latin word *baculum* means a small walking-stick. These palms are indigenous to temperate and tropical Australia.

The trunk is either single, or there may be a number of stems growing closely together (fasciculate), resembling the mode of growth of the algaroba tree when it grows in dense thickets. This fasciculate growth may be also compared to the clump habit of the bamboos, and of certain wine palms. The segments of the leaves are membranous in texture, and are split or toothed at their apices; the broader segments have many veins, the narrower ones have but a single vein; the segments at the free end of the leaf are confluent or apparently fused together. The margins of the leaf-segments are not especially thickened; at the base of the segment these margins are recurved. The petiole and midrib of the leaf is covered with a sparse scurfy layer; on the under side they are convex in cross-section, on the upper side, flat, or concave near the base of the leaf.

The flowers are greenish; the fruit is small, being but $\frac{1}{4}$ - $\frac{1}{2}$ inch in length, is elongate-ovoid in shape, and is greenish in color. The above characteristics apply to all the cane palms. There are several species (for original descriptions see F. Mueller, *Fragm. Phyt. Austral.*, Vol. VII, page 103), the one occurring in Honolulu being, in all probability, *Bacularia monostachya*.

This palm is planted as an ornamental in a number of Honolulu yards. The accompanying illustration is of a thriving plant in a yard on Emma street, opposite Emma Square. This species has a trunk 6-12 feet high, and leaves $1\frac{1}{2}$ -4 feet long. The sheath that occurs at the base of each leaf is broad, leathery in texture, and about six inches long. The leaf-segments are very irregular in shape and in distance apart. Their tips are sharp pointed; their bases are either fastened directly to the midrib of the leaf, or are somewhat tapering; the longest segments are about one foot long.

The fruit of this species is ovoid or sometimes nearly globular in shape; is about one-half inch long; and consists of a hard seed covered by a rather thin, succulent outer layer.

The foliage of the cane palms is of a very attractive shade of green, and is graceful in outline. The seeds germinate fairly well if planted in pots or flats on raised benches, and the young seedlings have no special pests or difficulties. There is no reason why these small and beautiful palms should not be more widely planted and better known. Because of their small size they will fit into many parts of a planting scheme where larger palms could not be used, as is illustrated by the specimen figured. It is growing close to and screening a lanai otherwise open to the street. The cane palms deserve better acquaintance.

A SHORT COURSE FOR TEACHERS.

The College of Hawaii offers a course of fifteen lectures for the benefit of teachers and others interested in the elementary schools.

These lectures deal with the various phases of the elementary school curriculum. The selection of subject-matter, the use of experiments and illustrative material, and similar practical topics, will receive special attention.

This course is open to teachers and the public free of charge. Persons desiring a certificate will register, will attend regularly, and will submit a note-book at the close of the course. The certificate states attendance and grade, and is sanctioned by the Department of Public Instruction.

The lectures are given at the College, on Mondays, 3 to 4 p. m., as follows:

1. Jan. 8—The Outlook for the Schools... President Gilmore
2. Jan. 15—The English Language and the Schools....
..... Dr. Andrews
3. Jan. 22—The School Library..... Miss Green
4. Jan. 29—School Architecture..... Prof. Young
5. Feb. 5—The Sanitation Problem and the Schools....
..... Prof. Keller
6. Feb. 12—Elementary Experiments in Physics... Prof. Ballou
7. Feb. 19—Simple Experiments in Chemistry.....
..... Prof. Dillingham
8. Feb. 26—Agriculture in the Public Schools... Prof. Krauss
9. Mch. 4—Domestic Science in the Schools..... Miss Lee
10. Mch. 11—The Study of the Sea..... Prof. Bryan
11. Mch. 18—Methods in Insect Study..... Dr. Severin
12. Mch. 25—The Plants of Hawaii..... Mr. Rock
13. Apr. 1—Material for History Lessons..... Miss Yoder
14. Apr. 22—The Pedagogy of Arithmetic... Prof. Donaghho
15. Apr. 29—Art Appreciation and the Schools... Miss Chipman

For any further information regarding this course, address

VAUGHAN MACCAUGHEY.

Phone 2040.

CHAMBER OF COMMERCE PEACE ESSAY PRIZE.

The attention of all students over fifteen years of age in all schools, both public and private, in the Territory of Hawaii, is called to a prize of \$50.00 offered by the Peace Committee of the Honolulu Chamber of Commerce to the best essay upon the subject of International Peace, all as per terms named below:

1. Subject: "International Peace."
2. Length: Not to exceed 2000 words.

3. Signatures: Essay to be signed with an assumed name, the real name to be in an enclosed envelope, duly sealed, said envelope to be labelled with the assumed name and not to be opened until the judges of essays have rendered their decision to the Peace Committee.

4. Time Limit of Submission: All essays to be sent, or handed in to the Peace Committee of Chamber of Commerce, on or before May 15, 1912.

5. Decision: Decision to be announced on Friday, May 31, 1912.

6. Judges: Judge William L. Whitney, Rev. William B. Oleson, Mrs. D. L. Withington.

7. Prize: Fifty dollars (\$50.00).

8. Open to Whom: All scholars over fifteen years of age in all schools, both public and private, in the Territory of Hawaii, are offered this opportunity to compete.

9. One Special Condition: Also in the sealed envelope shall be enclosed a statement signed by the writer of essay that outside assistance in its preparation has not been received.

This proposition is issued by

WILLIAM A. BOWEN, Chairman,
ROBERT F. LANGE,
GILBERT J. WALLER,

Honolulu Chamber of Commerce Peace Committee.

Issued Honolulu, January 18, 1912.

A LIST OF BULLETINS RELATING TO ELEMENTARY AGRICULTURE.

Compiled for the use of the elementary schools of the Territory of Hawaii.

Any of the bulletins in this list may be secured free of expense by writing to the department mentioned. In asking for any of these publications, the full title as given below must be plainly stated.

Agriculture in General—

1. Agriculture in Hawaii (H. P. C.).
2. Hawaii, Its Agricultural Possibilities (H. P. C.).
3. Country Life Education (U. S. D. A.).
4. The Teaching of Agriculture in the Rural Common Schools (U. S. D. A.).

BOARD OF AGRICULTURE AND FORESTRY.

Owing to circumstances outside of the control of the editor, no report of the meetings of the Board of Commissioners of Agriculture and Forestry, since that of the meeting of October 5 last, has been published in the Forester. Below are presented summaries of meetings since that date, condensation being exercised more liberally upon the earlier than the later minutes.

Meeting of October 5.

C. S. Judd, president and executive officer; J. M. Dowsett and H. M. von Holt, members; E. M. Ehrhorn, R. S. Hosmer and Dr. Victor A. Norgaard, heads of the divisions of entomology, forestry and animal industry, respectively; present.

Dr. Norgaard brought up the matter of an automobile for his division, which was deferred. He also obtained an excuse from the meeting to return to the Cavalry post at Leilehua, where a case of glanders had been discovered.

Mr. von Holt brought up the matter of damage to the Makiki garden caused by public works blasting, and it was voted to write to the Superintendent of Public Works and ask for precautions in the future.

Mr. Hosmer presented a special report on rabbits and it was decided to ask the coöperation of the Hawaiian Sugar Planters' Association in such action as might be desirable.

Mr. Ehrhorn made a statement of his observations in San Francisco of fruit shipments from the islands. Pineapples from the Clark Farm Co. packed in excelsior arrived in perfect condition, but some Wahiawa pineapples were soft and squashy. F. L. Waldron, through whom the latter were shipped, explained that rain had fallen on the pack, causing the fruit to heat. It was voted to write to fruit exporters and inform them of the liability of having their shipments condemned in San Francisco if received in poor condition.

Dr. E. R. Glaisyer resigned the position of assistant veterinarian on the island of Hawaii. It was voted to notify Theo. H. Davies & Co. that the veterinarian had resigned owing to insufficient support, and that future quarantine on Hawaii would have to be conducted by an inspector specially sent from Honolulu at the expense of the plantation receiving a shipment of animals.

An amendment to the rule allowing the shipment of taro from Honolulu to Hilo was adopted and ordered published.

Mr. Ehrhorn reported he had received a request from Superintendent John McLaren of Golden Gate Park, San Francisco, for some female deer of the Hawaiian variety in exchange for some elk. It was voted that the deer be presented to Golden Gate Park but no elk should be accepted, as they would prove a menace here.

Special Meeting of October 14.

C. S. Judd, president, and J. M. Dowsett and H. M. von Holt, members, were present.

Mr. Dowsett presented a resolution in regard to the Mediterranean fruit fly situation, which was unanimously adopted. Its preamble stated the danger of having Hawaiian fruit importation prohibited in California, and the need of greater efforts to control the invasion of the fly. It was resolved that W. M. Giffard of Honolulu be appointed an honorary member of the committee on entomology, with power to inaugurate and undertake a campaign of systematic clean culture to reduce the attack of the Mediterranean fruit fly, he to recommend for appointment the necessary number of inspectors to carry on the campaign and enforce such rules and regulations as might from time to time be adopted, he also to employ the services of an experienced economic entomologist or entomologists to search for natural enemies or effective parasites to combat the Mediterranean fruit fly.

It was further resolved to forward a copy of the above-mentioned resolution by the first outgoing mail to the California State Commissioners of Horticulture, notifying them that \$8750 had been provided by the government of Hawaii toward the expenses of this campaign, in expectation that the California commissioners would arrange for a like amount, making a total of \$17,500, the amount estimated as sufficient to carry on the campaign until more funds could be provided by next Legislature of Hawaii.

It was voted to publish a notice, in form submitted, to shippers of pineapples and bananas informing them that the California State Commission of Horticulture had notified this board that after October 31, 1911, and until further notice shipments of fresh pineapples and bananas packed in Hilo grass and banana leaves would be refused entry into California, but that pineapples and bananas packed in excelsior, rice straw, paper, crates or sacks would be accepted for the present.

Special Meeting of November 7.

Present, Messrs. Judd, Dowsett and von Holt.

Rule X, concerning horticultural sanitation in and about the city of Honolulu, was adopted and ordered sent to the Governor for approval. (This rule is published by authority in the present issue of the Forester.)

Special Meeting of November 2.

Charles S. Judd, president, and J. M. Dowsett and H. M. von Holt, members, constituted the board, others present being R. S. Hosmer, E. M. Ehrhorn and Dr. V. A. Norgaard, heads of divisions; S. T. Starrett, Territorial marketing superintendent;

C. E. Wright and Dr. H. B. Elliot of Hilo, and D. L. Conkling, Treasurer of Hawaii.

A report of Dr. Norgaard, dated October 9, was read by title and filed, and the president was authorized to write a letter, relative to a suggestion therein, to Dr. George S. Baker, veterinarian, of San Francisco.

It was voted to advertise for bids to furnish an automobile to the division of animal industry.

Mr. Dowsett mentioned a complaint by G. E. Schuman about the charge of 25 cents a head a day on non-quarantinable animals left at the quarantine station. Mr. Schuman expected forty-five mules to arrive that day from Seattle and, although they were not subject to quarantine, he wanted to keep them at the station for an unstated time, but thought \$11.25 a day for forty-five mules an exorbitant charge.

After a discussion—in which it came out that there was a station bill of \$80 against Mr. Schuman remaining unpaid although frequently demanded; also that much damage had been caused to posts and fences by animals kept at the station, to repair which the fees collected could not be applied but had to go into the Territorial treasury as realizations, and that the charge had originally been fixed for the sole purpose of discouraging the practice of keeping animals at the station beyond the three or four days that might be desirable for surveillance—the matter was referred to the animal industry committee with power to act.

Later, Dr. Norgaard having come in and brought up the same matter, the committee made its recommendations, which were forthwith adopted, to the effect that the use of the station be refused to Mr. Schuman until he settles back accounts, that the charge be left as it is, that the time for keeping non-quarantinable animals be limited to ten days, that notices accordingly be posted up in the station and that the executive officer take up with the Attorney-General the matters of lien upon animals and of the disposal of moneys collected.

Mr. Judd made a statement in regard to Rule IX, allowing the shipment of taro to Hilo for poi manufacturing. At Hilo the shipments could be followed up by the inspector, Brother Matthias Newell, and see that they were used only for making into poi. There were now various applications for permission to ship taro to all of the other islands.

Mr. Conkling spoke in behalf of a hui that he represented, assuring the board that none of the taro would be planted and that he was willing to have all shipments inspected.

The matter was referred to the committee on entomology with instructions to allow taro to be shipped to all points, with all due consideration to the condition of the taro when shipped.

Mr. Ehrhorn submitted the question of shipping the lotus root, both to inter-island points and the mainland, it being a customary foodstuff with the Chinese and Japanese in the same degree as

taro was with the Hawaiians. If perfectly clean it could be shipped without danger. Rule IX was devised to give the board control of all shipments. It was decided to refer the matter to the committee on entomology, to take such action as it saw fit, also to take up with the president the revision of Rule IX to cover every contingency.

Mr. Judd called attention to the fact that banana shipments to California were subject to certain inspection conditions for scale and stated that Mr. Starrett desired authority from the board to compel banana growers to keep their fields clean.

Mr. Starrett said banana shipments were being fumigated on account of mealy bug and rose scale. It seemed impossible to get the growers to clean their fields, but he would be glad to assume the work in the interest of clean culture.

Mr. Ehrhorn thought six months would be enough in which to accomplish the work, and recommended that Mr. Starrett be given the authority desired.

It was voted that the matter be referred to the committee on entomology which should make a full report back to the board.

There was a discussion on the Mediterranean fruit fly based on a letter the president had received from Commissioner Jeffrey of California, it being stated that since the letter had been written Mr. Jeffrey had retired and Mr. Cook been appointed in his place.

Mr. Dowsett, commenting on the California official changes, suggested that Mr. Giffard should go to California and personally consult with the authorities. No action was taken.

Mr. Judd reported the Mediterranean fruit fly regulations in the hands of the Attorney General. He also appointed Mr. Dowsett on the entomology committee during the absence of Mr. Waterhouse.

Dr. Norgaard reported progress in the Hilo animal quarantine station, everything being now ready for the board's approval. Mr. Wright believed it would cost \$1000 to move the stalls of the Volcano Stables Co. from the ground to be used. The matter was referred to the committee on animal industry with power to act.

Meeting of November 13.

Present: Chas. S. Judd, president and executive officer; Paul R. Isenberg, J. M. Dowsett, H. M. von Holt, members; R. S. Hosmer, V. A. Norgaard, E. M. Ehrhorn and W. M. Giffard.

Mr. Judd presented and read Rule X. Amendments were suggested and carried to cover throwing discarded fruit on the sea beach and to insert certain words, after which Rule X with the proposed amendments was unanimously approved subject to the Governor's approval.

Reports of the Division of Forestry were received, including one by Mr. Hosmer on awa matters.

In general discussion it was stated that there is very little awa growing on government land under the control of this department, and where it did exist it was almost inaccessible, it having been purposely planted at the tops of mountain ridges and places difficult of access by cattle; that there was always danger of fire started by campers and probably more harm than good would result from allowing it to be gathered, and it was doubtful whether the income to be derived would equal the possible losses. It was also stated that trespass is constantly going on and impossible to prevent. It was suggested that the Nahiku Rubber Co. was probably gathering more awa than anyone else and was the most reliable party interested and could probably give more definite information as to its value and the most feasible manner of handling.

It was unanimously voted that the executive officer be instructed to take the matter up with the Nahiku Rubber Co. so as to ascertain the most feasible way of handling the matter; that no awa licenses be granted at this meeting, but that the matter of future action be left entirely in the hands of the executive officer with full power to act as he sees fit.

W. M. Giffard, director of fruit fly control, read his report and requested suggestions.

The report was accepted and the appointments of the inspectors mentioned in the report were confirmed and commissions ordered to be issued by the executive officer.

In general discussion it was stated that the work of the fruit fly control had progressed very efficiently and Mr. Giffard deserved great commendation.

Mr. Isenberg stated that a great deal of fruit fly existed on Kauai but he had not found any on Maui.

C. Montague Cooke was appointed as fire warden for Manoa Valley in place of Byron O. Clark, resigned.

Meeting of December 11.

Charles S. Judd, president and executive officer; J. M. Dowsett, Paul R. Isenberg and H. M. von Holt, commissioners.

Mr. Judd stated that Rule IX had been further amended to provide for the shipment of lotus, potatoes and other tubers. He read the draft and asked for action.

On motion Rule IX was rescinded and Rule XI adopted in lieu thereof.

Mr. Judd then read Rule XII in final form, said rule relating to the enforcement of clean culture in infested banana orchards, etc., and requested action. The rule was adopted as read.

(Both of these rules are officially published in this number of the Forester.)

Reports of the Division of Forestry and the Division of Animal Industry were read.

Dr. Nørgaard was invited to explain his proposition to quarantine dogs imported into the Territory on account of danger of rabies. Dr. Nørgaard went over the matter covered by his report.

Mr. von Holt favored acting at once in accordance with the recommendations of the report. Mr. Isenberg and Mr. Dowsett stated that they had received their copies of the report too late to give proper attention and suggested that the matter go over until it could be carefully considered and in the meantime it be thoroughly threshed out by the newspapers in order to get an expression of public opinion.

It was voted unanimously that action on the proposition be deferred to a special meeting on December 18.

Special Meeting of December 18.

There were present Charles S. Judd, president and executive officer; Paul R. Isenberg, H. M. von Holt and J. M. Dowsett, commissioners.

Reports of Dr. Nørgaard and Dr. L. E. Case, assistant Territorial veterinarian, were accepted.

The proposed draft of Rule VI was presented by Mr. Judd and action of the Board requested.

After a general discussion it was moved by Mr. Isenberg that the paragraph requiring a certificate by a veterinarian and one other party as to the health of any dog shipped to the Islands be stricken out and that the required quarantine period be made four months or such longer time as the Board should deem necessary not to exceed six months from the date of embarkation; that the portion of paragraph 1 referring particularly to California be amended so as to read "the United States and foreign countries." This motion was seconded by Mr. von Holt and on vote unanimously carried.

On motion of Mr. von Holt the Rule was approved as amended without return to the Board but subject to the approval of the Attorney General and the Governor of Hawaii. Seconded by Mr. Isenberg and unanimously carried.

Special Meeting of December 29.

Charles S. Judd, president and executive officer; Paul R. Isenberg, J. M. Dowsett and Albert Waterhouse, commissioners, present.

The report of the Division of Entomology was accepted and filed.

Mr. Judd presented Rule VI and stated that but one minor correction had been made by the Attorney General, which he read. Mr. Judd also presented written suggestions of Dr. Nørgaard to modify the rule so as to allow the importation of dogs from England and New Zealand without quarantine.

There was a lengthy and general discussion as to the advisability of adopting the suggestions, Mr. Dowsett stating that he believed that if the rule were so modified it would then seem unfair not to modify it as to various States of the United States which might be free from rabies. Mr. Waterhouse thought there should be no modification in any case, inasmuch as dogs would have to pass through infected districts or come in contact with animals not known to be free of the disease while in transit. Mr. Isenberg wanted to go on record as being more afraid of infection from mangy dogs at present roaming the streets than from a remote possibility of rabies, no case of which had ever been known in the Territory. Mr. Dowsett thought the executive officer should ask the Board of Supervisors to enforce the existing regulations for tagging dogs and keeping them off the streets.

It was moved by Mr. Waterhouse, seconded by Mr. Dowsett, that the rule as presented be passed to the Governor for approval.

At this time Dr. Norgaard arrived and was informed by Mr. Dowsett of the views of the Board and its determination not to adopt the suggestions in his letter. After remarks from Dr. Norgaard and further discussion, Mr. Dowsett asked that the question be put before the Board, and on vote it was unanimously carried that the Rule be passed in its present form to the Governor and Attorney General.

Dr. Norgaard stated that a number of suspected cases of spinal meningitis had been reported on Maui, and it seemed advisable for him to make the trip there for necessary investigation. He was therefore excused from the meeting.

Mr. Judd presented Rule XII returned by the Governor and read it to bring minor changes before the Board, upon which it was unanimously adopted in its present form.

On suggestion of Mr. Judd, it was unanimously voted that S. T. Starrett be appointed honorary inspector to assist in the enforcement of Rule XII.

On suggestion of Mr. Judd, it was unanimously voted that H. A. Weinland, the representative from the California State Board of Horticulture, be appointed an honorary inspector to assist in the enforcement of Rule XII.

On suggestion of Mr. Ehrhorn, it was unanimously voted that Joe Clarke (a cotton grower at Waipio) be appointed honorary inspector to assist in the enforcement of Rule XII.

Mr. Isenberg stated that it had been brought to his attention by Julian Monsarrat that some irregularity exists regarding inspection of livestock at San Francisco and particularly a variance in charges for inspection and requested that the Board investigate.

It was unanimously voted that the committee on animal industry be directed to take the matter up with Dr. Norgaard and after a thorough investigation report its findings.

Mr. Judd presented a proposed forestry plan for Honolulu Plantation Company covered by a letter directed by Mr. Hosmer to Jas. Gibb, manager of the plantation.

After general discussion it was decided to be inadvisable to contract according to the suggestions in the letter, as this was an initial undertaking. It was thought that questions of price of stumpage, time for cutting and amount of timber to be cut should be more carefully considered.

The forestry committee was directed to take the matter up with Mr. Hosmer, prepare a proposition along the lines suggested and report back.

On suggestion of Mr. Hosmer, David T. Fleming was appointed district forester and also district fire warden for the district of Kaanapali, Maui.

Mr. Hosmer stated that it had come to his attention that the thimbleberry, a pest known to be as bad as lantana, existing near the volcano on Hawaii, had recently been brought to Honolulu by certain parties and suggested that the Board take action to prevent its maintenance here.

By unanimous vote the executive officer was directed to draft a resolution making it prohibitive to transport the thimbleberry from one island to another or maintain it on this island.

Mr. Isenberg stated there were a great many rabbits at large on Oahu, and after discussion it was unanimously voted that the executive officer be directed to address a letter to the Board of Supervisors requesting them to enforce the regulation regarding rabbits.

Mr. Hosmer stated that the press bulletin of the Forestry Division relative to the planting of trees had become exhausted and advised a new supply. It was ordered unanimously that the bulletin be printed, the cost not to exceed \$30.

REPORT ON FRUIT FLY CONTROL.

Honolulu, January 2, 1912.

To the President and Commissioners, Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I beg to submit the following report as to Fruit Fly Control work for the period ending December 31, 1911, viz.:

Inspection.

In addition to the continued systematic inspection of districts 3, 4, 5 and 6, bounded by Punahou street on the east and Liliha street on the west, the following have been partly inspected when possible, viz., districts 1, 2 and 7. These latter areas cover a number of lots in all of which fruit of various kinds is grown, but the distances between the said lots are in many instances far

apart and because of this much of the inspection period is wasted in covering each respective district. Until the staff of inspectors is materially increased it will be absolutely impossible to properly inspect not only the three important districts above named, but also district 8. This latter takes in the Kaimuki and Kapiolani Park residential areas, a section which is at present very badly infected.

General Conditions in Inspected Districts.

The destruction of large quantities of fruit (principally sweet and Chinese oranges, loquats, coffee berries and eugenias, etc., in districts 3, 4, 5 and 6 has brought about a marked improvement in the inspection of these sections. It is, however, to be regretted that there are still a few residents who do not care to strip their orange and other trees of uninfected ripe or part ripe fruit. The majority, however, have heartily coöperated and are still doing what they can to assist the work in hand. If *all* the residents in the above districts worked heartily and hand in hand to keep their orange, coffee and other trees entirely stripped of fruit for the next three months there would no doubt be a marked difference in the infestation of mango and alligator pear trees when these come into bearing shortly. Leaving fruit on the trees at this season and under the improved fruit fly conditions, which at this time exist in the districts above named, only enhances the chances for reinfestation of the whole neighborhood where such fruits have been allowed to remain on trees. Some residents have altogether stripped their trees of the remaining fruits, preferring if possible, to secure comparative immunity from infestation when their alligator pears come into season, while others do not appear to take any interest in this phase of the situation, preferring, it would appear, to leave their part-ripe fruit on the trees and thereby bring about the reinfestation above referred to. That a few scattered residents should take this attitude is to be deplored. Fortunately, such people are in the minority, but in sufficient number to cause much extra work because of repeated inspection of their fruit trees. The scarcity of ripe fruit at the present time in the districts named must compel the adult flies to seek hosts in which to breed, and all green or part-ripe fruit left on the trees will in consequence be attacked long before it would be in a condition for use. Such being the case, it is regrettable that a wholesale clean-up of the balance of the orange crops cannot be inaugurated. Unless the fruit shows signs of infection the inspectors are powerless under the present regulations. On the contrary, should the inspector notice infected fruit on the tree he can and does compel its destruction.

Uninspected Districts.

These are situate to the east of Punahou street and to the west of Liliha, viz., districts 1, 2, 7 and 8, as shown on the map in this department. The lack of funds to employ additional inspectors has prevented more than an occasional visit to these sections. It is found that all these areas, but more particularly districts 7 and 8, are badly infected and need immediate and continued attention. Pending the receipt of additional funds which have been promised your Board, I have temporarily appointed, with the approval of the president, two additional inspectors to cover the last-named districts. These men will commence their duties during the early days of this month, but will have to be laid off on February 1 unless the promised funds are forthcoming. It is to be much regretted that the available funds will not allow of the immediate and permanent employment of a larger staff of inspectors, more particularly as the mango season will be on very shortly and the work of seeing that all fallen fruit is gathered up and destroyed daily will keep a large force busily employed.

General Remarks.

The details of the methods and work laid out and now in use by your director were explained and illustrated to Dr. Wilcox of the Federal Experiment Station, Mr. E. M. Ehrhorn of the Entomological Division of the Board of Agriculture and Forestry, and Mr. O. H. Swezey of the Division of Entomology, H. S. P. A. Experiment Station. These gentlemen were formerly members of the advisory committee of which your director was also a member, and all heartily approve of the present system adopted for the control of the fruit fly within urban and suburban limits. The system referred to has already been freely explained to your Board, and there is no apparent reason to make further reference to it at this time. The system will be improved from time to time as the work goes on, or just as soon as all the precinct boundaries can be definitely settled.

The thanks of the director are due to Dr. Wilcox, Messrs. Ehrhorn and Swezey for assistance rendered in breeding experiments. Up to the present it has been found that among fruits infested with Mediterranean fruit fly are the following: strawberry and all other garden varieties of guava, peach, alligator pear, Chinese orange, mandarin orange, sweet orange, green peppers, fig, rose apple, star apple, mountain apple, coffee berry, wild guava, Chinese plum (*Horonia emarginata*), mango, overripe papaya, varieties of lime, baby papaya (*Carica querifolia*), *Carrisa arduina*, Chinese ink berry, grape fruit, prickly pear, *eugenia uniflora*, loquat and "kamani" (umbrella tree) nut.

On December 26, Mr. Weinland of the staff of the State Horticultural Commission of California, arrived from San Francisco. That gentleman has been delegated by the above-named commission to represent its interests particularly in reference to the ex-

port shipments of all kinds of fruit, including bananas and pines, to the Pacific Coast. Mr. Weinland has hardly had time to enter upon any special line of work, but will no doubt do so very shortly. He is also expected to coöperate with the special line of campaign work now under the supervision of your director.

Respectfully submitted,

W. M. GIFFARD,
Honorary Member Entomological Committee,
Board of Agriculture and Forestry, T. H.

DIVISION OF FORESTRY.

Honolulu, December 30, 1911.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows the report of the Division of Forestry for the month of December, 1911:

H. S. P. A. Meeting.

At the annual session of the Hawaiian Sugar Planters' Association, held the first week of December, I delivered a short address on the need of forest work in Hawaii, with special reference to the sugar plantations, and, in connection with the suggestion that the water revenues from forest reserves be used for forest work, outlined briefly a plan for forest fencing, tree planting and protection by a ranger service on the more important forests.

Following the report of the chairman of the committee on forestry, Mr. Albert Horner, the Association adopted a resolution calling upon the trustees to take action on the following specific recommendations: (1) That a careful investigation be made of the possibility of introducing insect-eating birds into Hawaii; (2) that financial assistance be given the Division of Forestry in its work of propagating seedling trees for corporations desiring large numbers of seedlings; (3) that "it be brought forcibly to the attention of each plantation that it is the judgment of the Association that, for their own interest and strictly from a business standpoint, the individual plantations ought to pay greater attention to tree planting and also to protecting the native forest by fencing;" (4) that "the Association approves the adoption by the Territory, as its definite policy, of the suggestion that as far as practicable the revenues derived by the government from the leases or licenses of waters flowing from the forest reserves be used in forest work, and that the trustees be requested so to recommend to the appropriate Territorial officials."

Forest Planting, Kula, Maui.

In connection with the tree planting requirements of Leases Nos. 742 and 743 of the Land Office for the lands in the Kula District, Maui, known as Waiakoa, Alae 3-4, and Waiohuli, Keokoa mauka tracts, a detailed planting plan was drawn up by the Superintendent of Forestry and delivered early in December to Mr. A. M. Brown, the lessee, and to Mr. Pia Cockett, the manager of the Cornwell Ranch. The leases require that approximately 100 trees be planted for each acre in these two tracts. The plan outlines how this work shall be done, and gives directions as to the several steps in the process.

Exhibit at Poultry Show.

At the annual exhibition of the Hawaiian Poultry Association held December 13 to 16, 1911, the Division of Forestry had an exhibition of seedling trees of various kinds and in different stages, of forest reserve maps and of island woods, the latter being the collection got together for the Alaska-Yukon-Pacific Exposition at Seattle in 1909.

Proposed Forest Planting at Aiea.

On December 13, 1911, I visited the Honolulu plantation at Aiea to inspect the forest planting being done by that corporation on lands leased from the Bishop Estate and to confer with the manager, Mr. James Gibb, in regard to a proposition to plant with forest trees a part of the government land of Aiea within the Ewa forest reserve. A report on this subject was submitted to the Board later in the month.

Proposed Forest Reserves.

On December 19, in company with Mr. Walter E. Wall, government surveyor, I visited the government land of Kulioouou on this Island, to determine the boundary of a proposed forest reserve at its mauka end. This matter will be brought before the Board in due course. During the month progress has been made on other pending forest reserve projects, more particularly the proposed reserves on Molokai and on the Waianae hills, Oahu.

Plantation Tree Planting.

During December several additional large orders have been placed by sugar plantation companies for tree seedlings for forest planting. Mr. Haugh's report gives the details of the plants sent out. It is transmitted herewith.

Congressional Vegetable Seed.

The usual annual consignment of free vegetable seed (about 10,000 packets) has been received from the Delegate to Congress, Hon. J. K. Kalaniana'ole. It is now being sent out to the public schools having school gardens and to selected names on the mailing list. Packets of any seed remaining can be had upon application by letter or in person at the Government Nursery. The

seed consists of the more common kinds of vegetables. There are only enough flower seeds for the use of the schools.

Botanical Bulletin by Mr. Rock.

There has just been issued as an illustrated publication of the College of Hawaii (Bulletin No. 1), "Notes upon Hawaiian Plants, with Descriptions of New Species and Varieties," by Joseph F. Rock. In that Mr. Rock is now consulting botanist of this Board and that much of the field work on which this bulletin is based was done while he was still botanical assistant on our staff, it is appropriate that it should be noted here. Copies of the bulletin may be obtained upon application to the College of Hawaii, Honolulu.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

The principal work done during the month of December is as follows:

Nursery—Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot- grown. | Total. |
|--------------|-------------------|---------------------------|----------------|------------|
| Sold | 500 | 3250 | 1456 | 5206 |
| Gratis | 500 | 150 | .... | 650 |
| | <hr/> 1000 | <hr/> 3400 | <hr/> 1456 | <hr/> 5850 |

Collections for the month of December amounted to \$238.45, itemized as follows:

| | |
|--|----------------|
| On account of plants sold | \$ 77.95 |
| From the Division of Animal Industry on ac- count of sale of one yellow mare..... | 125.00 |
| On account of use of quarantine station..... | 35.50 |
| | <hr/> \$238.45 |

Plantation Companies and Other Corporations.

Orders received and plants distributed during the month amounted to 12,000 plants ordered and 18,000 in seed boxes and 4000 in transplant boxes distributed.

Experiment Garden, Makiki.

The transplanting of seedlings, sterilizing and preparing soil and doing other routine work constituted the principal work at the station.

U. S. Experimental Planting, Nuuanu Valley.

The two men employed have been hoeing and clearing away the dense growth of Hilo grass from the trees. Owing to the vigorous growth of the Hilo grass in Nuuanu Valley the work of keeping it in check is no small matter, and the two men are kept busy doing the work.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of December, as follows:

During the month, we boarded 32 vessels and found vegetable matter on 18 of them. Careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 949 | 21,941 |
| Fumigated before releasing | 36 | 842 |
| Burned | 38 | 496 |
| Total inspected | 1,023 | 23,279 |

Rice Shipments.

Sixteen thousand two hundred and fifty-three bags of rice arrived during the month, and being found free from insect pests was permitted to enter the Territory.

One shipment of moulding sand for the Iron Works arrived on the Rithct and after inspection was passed.

Pests Intercepted.

Three large consignments of plants came on the Siberia from Japan, and among the lot we destroyed by burning all the orange trees, about 350, as they were badly infested with the white fly, *Aleyrodes citri*, the blister fungus *Cladosporium citri*, and a serious leaf miner. On some plum trees we found the white peach scale, *Aulacaspis pentagona*, and a lichen which appears to be a serious pest and would raise havoc with trees here if ever introduced. All soil around the plants was removed, as we have

found many ants in the past, and in this lot grubs of beetles *Melolontha sp.* and also the larvae of probably the Japanese beetle.

One orchid from Manila was destroyed as the roots and bulbs contained larvae and pupae of *Actheopcus aterrimus*, the orchid weevil.

On opening a tub of supposed pickled fruit from Japan a customhouse inspector found that it contained fresh persimmons, and turned the tub over to us for action. We destroyed the lot by burning the fruit at the incinerator.

Inter-Island Inspection.

During the month 54 steamers were attended to going from Honolulu to the other islands. Eighty-two lots of plants were inspected, and of these 24 plants were rejected on account of not coming up to our regulations. Under the new rule, 84 bags of taro and 17 bags of lily root were passed; 44 pkgs. of fruit, 15 pkgs. of vegetables and 1 bag of green arrow root were refused shipment; 1 pkg. of beans was found infested with maggots, and 1 pkg. of cucumbers was also found infested with maggots. These were probably the larvae of the melon fly, but the two lots were destroyed.

Hilo Inspection.

Brother M. Newell, inspector at Hilo, reports that 4 steamers brought vegetable matter consisting of 196 lots and 3839 parcels. One case of sprouts was destroyed on account of aphid infestation and a crate of turnips was destroyed on account of the turnip moth larvae. All the rest was passed as free from pests.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, December 31, 1911.

Hon. C. S. Judd, President and Executive Officer, Board of Agriculture and Forestry, Honolulu.

Sir:—I have the honor to submit herewith the regular monthly report of the Division of Animal Industry for the period December 1 to December 31, 1911.

Rabies Regulation.

As might have been expected, the proposed regulation, imposing a four months' quarantine on all dogs arriving in the Territory when coming from or through countries where rabies is

prevalent, has caused considerable discussion in the local papers. It is, however, worthy of note that, barring a preliminary tone of flippancy and the presentation by one paper of the usual fallacies in regard to the non-existence of such a disease, the press has almost unanimously supported the measure—that is, on the presumption that dogs coming from countries where the disease is officially announced not to exist are to be admitted without detention. This latter point, which was discussed at an extraordinary meeting of the Board on December 29, did not meet with the approval of the members present, who considered that the embargo should apply to all dogs alike, regardless of their coming from infected or uninfected countries. The rule, however, did not receive the required approval of the Governor, who held that it was unconstitutional to quarantine against a disease in a country where it does not exist.

It will be remembered from my last report that two of the leading ~~dog~~ breeding countries were mentioned as being free from rabies, namely, England and New Zealand, and that so long as proper precautions were taken to prevent infection in transit it was considered safe for me to recommend that dogs from these two countries at least should be admitted to the Territory without quarantine. Since that time, however, an article in an English newspaper, Lloyd's Weekly News, by Dr. Andrew Wilson, and entitled "About Hydrophobia," has come to notice. From this article it would appear that an English master of foxhounds had died recently (the paper was dated November, 1911) from hydrophobia as the result of having been bitten by a fox some months previously. This case, which undoubtedly is authentic, is so much more remarkable, as no case of rabies in dogs or hydrophobia in man has been recorded in Great Britain and Ireland since 1902, or nearly ten years ago, and the author's explanation to the effect that "the animal, the fox, is wild, and very unlikely to infect anybody who does not come in close contact with him," does not seem very plausible. A careful perusal of the current English veterinary periodicals containing weekly "Summary of Returns" of diseases of animals officially reported has failed to show the presence of a single case of rabies. That this disease—which must be continuously transmitted from animal to animal in order not to die out, as nearly every case terminates fatally within a few days after the appearance of the symptoms, and before which time the infection cannot be transmitted—should persist among the wild canines for ten years, and especially among the foxes, without a single case of rabies among the dogs or the foxhounds occurring, does not seem likely, especially when it is considered that the English fox is being constantly hunted with hounds, and that no fox is ever killed without inflicting numerous wounds on its natural enemies. I am therefore strongly inclined to believe that either the master of hounds in question did not die

And if that is the case in one place there is no reason why the same condition should not exist in other places in that country. Under these circumstances, it would not seem advisable to grant permits to import dogs from England without quarantine until at least an official explanation of the conflicting statements and conditions can be obtained, and to this end I would suggest that a letter be prepared for the signature of the president and executive officer of the Board and addressed to the Board of Agriculture and Fisheries in London.

I would further respectfully submit that, in case the Board should decide to adopt the rule as amended by the Governor, a paragraph be added requiring prospective importers of dogs to obtain from the Board a permit of importation, said permit to set forth the State, Territory or country whence the dog is to be obtained, the probable port of embarkation, and the routing, so as to insure against infection while in transit.

I would also call the attention of the Board to the necessity of providing kennels at the two ports of entry, Honolulu and Hilo, as the same must be ready to receive the dogs on the day that the regulation goes into effect. Some means must further be provided for the safe transportation of dogs from the ship to the quarantine station. A light covered wagon with three or four compartments will in my opinion be required to meet all incoming boats, as well as a man to drive the same and to care for the dogs while in quarantine.

Instructions to masters of steamships or vessels, as well as to agents for the same, must be issued, either as part of the regulations or as a letter of instruction to the effect that no dog shall be allowed to leave a ship, boat or vessel until the arrival of the inspector, but must be kept securely tied or otherwise confined on board until removed by the inspector or his assistant. Instructions of this nature, in order to be effective, must, in my opinion, form part of the regulation, as nothing short of the penalty clause will make them observed or adhered to.

I would finally submit that the rule be not made to take effect until notice of the same can be sent to San Francisco, Seattle, Portland, Vancouver and other ports of the Pacific, both occidental and oriental.

The cost of keep, while touched on in the regulation, might be made more definite by adding "from \$5 to \$10 per month, according to the size of the animal."

Epidemic on Maui.

At the request of the Deputy Territorial Veterinarian for Maui, as well as the president of the Maui Agricultural Co., I left Honolulu for Maui on December 29, in order to investigate an outbreak of cerebro spinal meningitis among the mules on this plantation. No fewer than ten animals had died within the past three

weeks, and a number were sick or convalescing. The diagnosis which was determined by Dr. Fitzgerald was found to be cor- from hydrophobia, or else that the presence of the disease in Wiltshire, where the case occurred, is being wilfully suppressed. rect, and the cause musty or mouldy feedstuffs, was also veri- fied. A careful examination of the feed bins in various stables revealed the presence of but one sack of badly spoiled bran, a number of the same having previously been removed. Suspicion was, however, directed toward the water supply as a further source of infection, the fact of the disease having occurred in three different stables, widely separated, but obtaining water from the same source, suggesting that the contagion was carried by the water.

The possibility of arresting the outbreak by cutting off this source of transmission seemed plausible, and as all work animals are watered from cement troughs located in the stable yards and are not allowed to drink from ditches or water holes, it was proposed to filter all the drinking water through Pasteur filters. As some of these were on hand, orders were given to have them attached at once, and as these filters will not alone retain the micro-organisms, but will also remove eggs and embryos of in- testinal parasites contained in the water, nothing but good can result from their use, and it is fondly hoped that conditions will improve and that no new cases will develop.

As no report has been received since my return, I am unable to state the result, if any, of this experiment.

Importation of Stock.

As will be seen from the appended list of importations, only six horses were sent to the quarantine station during the past month, while nearly fifty head of horses and mules arrived from Seattle and were admitted after inspection and examination of the accompanying certificates of mallein test.

The sum of \$32.25 was collected for the use of the station for mules and horses kept there beyond the quarantine period. This money has been turned into the treasury and receipt for the same is attached herewith.

The new automobile has arrived and the third general tuber- culin test of all dairy cattle will begin this week.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

IMPORTATIONS SINCE THE LAST MEETING.

S. S. Mexican, Salina Cruz, December 6, 1911—1 ct. chix, K. Chun.

S. S. Lurline, San Francisco, December 13, 1911—2 mares, C. Brewer & Co.; 2 horses, Capt. Whitehead; 1 thoroughbred stallion, A. W. Carter; 8 cts. poultry.

S. S. Manchuria, Orient, December 15, 1911—3 cts. Jap. games.

S. S. Sierra, San Francisco, December 22, 1911—1 saddle horse, A. W. Carter; 1 tank black trout, C. Brewer & Co.; 3 cts. poultry.

S. S. Siberia, San Francisco, December 25, 1911—1 Boston bulldog, Mrs. Walters; 1 Boston bulldog, Mrs. Allen.

S. S. Wilhelmina, San Francisco, December 26, 1911—1 ct. white rats, Leprosy Investigation Station; 1 ct. White Leghorns, E. O. Hall & Son.

S. S. Hyades, Seattle, January 2, 1912—1 grade Jersey cow, Alexander & Baldwin; 17 horses, E. E. Paxton; 29 mules, Alexander & Baldwin (G. Schuman); 1 ct. chix, Mrs. Turrill.

S. S. China, San Francisco, January 3, 1912—1 Spitz dog, Hen Wise.

BY AUTHORITY.

RULE X.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY, CONCERNING HORTICULTURAL SANITATION IN AND ABOUT THE CITY OF HONOLULU.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii, hereby make the following rules and regulations for the purpose of controlling and diminishing or eradicating the Mediterranean fruit fly and other injurious fruit flies and the larvae thereof and preventing or diminishing the damage and loss causable by them.

Section 1. These rules and regulations shall apply to the region bounded as follows, to be known as the quarantine district: On the south by the sea; on the west by the road in Moanalua leading from the tracks of the Oahu Railway and Land Company's railroad mauka on the Honolulu side of Salt Lake to the main road from Honolulu to Ewa; thence along said main road to its junction with the road leading up to the polo field in Moanalua valley; on the north by a line following the sinuosities of the ridges and valleys and running along the most mauka residence lots on the ridges and in the valleys, excepting Tantalus Heights, but including the residence lots on Tantalus; and on the east by the western boundary of the land of Waialae-nui.

Section 2. All fruit, ripe or unripe, whether on the ground or on the tree or elsewhere, and all melons and vegetables, which appear to be infected by the Mediterranean fruit fly or any other injurious fruit fly or the larvae thereof within the quarantined district shall daily be collected by the occupant, or, if no occupant, by the controller of the property on which such fruit, melon or vegetable exists, and thoroughly destroyed by burning or by such other effective means as the duly appointed agents of the Board of Agriculture and Forestry may deem sufficient, or so treated as effectually to destroy any larvae therein of any such fly, or, if within the garbage collection limits, placed in suitable can containers which shall be set conveniently for the garbage collectors.

Section 3. Inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter and inspect any and all premises within the quarantined district and enforce the provisions of Section 2. They are also hereby empowered to remove or cause to be removed from fruit trees, and shrubs and plants, any and all fruit or vegetables which are infected with the Mediterranean or other fruit fly or the larvae thereof and to have the same destroyed, treated or disposed of in the manner prescribed in Section 2.

Section 4. No fruit, melon or vegetable infected by any such fruit fly or the larvae thereof shall be sold or offered for sale within the quarantined district.

Section 5. Any fruit, melon or vegetable, found exposed for sale in the quarantined district which appears to be infected by the larvae of the Mediterranean or other fruit fly, may be seized by any inspector or other duly appointed agent of the Board of Agriculture and Forestry and destroyed.

Section 6. No fruit, melon or vegetable shall be thrown, discarded or placed on any sidewalk, road, thoroughfare, road gutter, river-bed, sea-beach, vacant lot or park, within the quarantined district except as aforesaid.

Section 7. Any person violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws, as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

Section 8. This rule shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, November 14th, 1911.

BY AUTHORITY.

RULE XI.

RULE AND REGULATION BY THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE PREVENTION OF DISTRIBUTION OF INSECT PESTS FROM OAHU TO THE OTHER ISLANDS.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rule and regulation:

Section 1. For the purpose of preventing the spread to other islands in this Territory of insect pests which have established themselves on the Island of Oahu, all persons and corporations are hereby prohibited from carrying or shipping from said Island of Oahu to any other island in said Territory, any fruit, vegetable, melon or root, except fruits, melons, roots or vegetables in original packages imported into this Territory from other places; and all persons and corporations are hereby prohibited from carrying or shipping any plant or any soil attached to any plant or any other soil, from said Island of Oahu to any other island in this Territory; provided, however, that plants and soils which have been thoroughly fumigated or sterilized under the supervision of the Superintendent of Entomology or his assistants, and taro, lily-root, tubers and roots which are to be used for food purposes only, upon inspection by the Superintendent of Entomology or his assistants, may be so carried or shipped when properly tagged and certified by any such officer to be free from insect pests.

Section 2. Any person or corporation violating the above rule shall be guilty of a misdemeanor and shall be punished by a fine not to exceed Five Hundred Dollars as provided by Section 390 of the Revised Laws as amended by Act 82 of the Session Laws of 1905 and Act 112 of the Session Laws of 1907.

Section 3. Rule No. 9 of the Board of Commissioners of Agriculture and Forestry adopted and published on the 28th day of June, 1911, is hereby rescinded.

Section 4. This regulation shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, December 18, 1911.

BY AUTHORITY.

RULE XII.

RULE AND REGULATION OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY CONCERNING THE CONTROL OF INSECT AND OTHER VEGETABLE PESTS IN THE TERRITORY OF HAWAII.

The Board of Commissioners of Agriculture and Forestry of the Territory of Hawaii hereby make the following rules and regulations for

the purpose of controlling and diminishing or eradicating injurious insects, blights, scales and pests, injurious or liable to become injurious, to trees, plants, or other vegetation of value and the fruit thereof.

Section 1. In view of the presence of injurious insects, blights, scales and pests which are a detriment or which may become a detriment to the agricultural industries of the Territory and for the purpose of preventing or diminishing the damage and loss causable by them, all inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter at all reasonable times any and all farms, orchards and premises in said Territory, where there are agricultural growths and products, for the purpose of inspecting trees, plants, cuttings, vines, fruits, vegetables, tubers, roots, seeds and other agricultural growths and products thereon.

Section 2. Whenever such injurious insects, blights, scales, or pests are discovered on any premises, inspectors and other duly appointed agents of the Board of Agriculture and Forestry shall advise the growers, of the crops on such premises as to the best methods of reducing the damage that may be caused thereby, and all fruits, plants, cuttings, vines, vegetables, tubers, roots, seeds or leaves infected with any such insect, blight, scale or pest, shall be destroyed at once by the grower thereof by methods prescribed by the Superintendent of Entomology upon the request of any such inspector or agent.

Section 3. All inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to seize and destroy any fruit, plant, cutting, vines, vegetables, tubers, roots, seeds, or leaves infected with any such insects, blights, scales or pests found in any shipment in any part of the Territory.

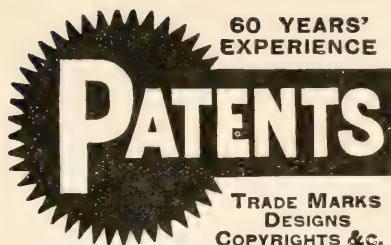
Section 4. Any person, firm or corporation violating the above rule shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws, as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

Section 5. This rule shall take effect upon its approval by the Governor.

Approved:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii, December 30, 1911.



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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
 "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
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- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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FEBRUARY, 1912

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHEHOEN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

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No. 2.

The Agricultural News (West Indies) for November 25 contains a leading article of two pages on "The Assimilation of Nitrogen by Rice," which consists mainly of a review of Bulletin No. 24 of the Hawaii Agricultural Experiment Station.

A machine for separating and straining lime juice, which costs only \$100 and has a capacity of 300 gallons an hour—equivalent to about forty barrels of limes—has been proved successful at the botanic station, Dominica. It is surprising that the growing of limes, on a commercial basis, is greatly neglected in Hawaii where the demand for the fresh fruit is generally ahead of the supply. Both limes and lime juice ought to be articles of profitable export from these islands.

THE COTTON WORM.

Hawaii was not singular the past year in receiving an invasion of the cotton boll worm, although coming in the nascent period of the revived industry—after suspension of enterprise in that product for more than a generation's lifetime—the blow fell with peculiar force here. A letter to the Imperial department of agriculture, West Indies, from W. D. Hunter, in charge of the southern field crop insect investigations of the bureau of entomology of the United States department of agriculture, stated that a most extraordinary outbreak of the cotton worm (*Alabama argillacea*) had been experienced in the United States during the past cotton-growing season, the cotton fields from Texas to the Atlantic having been completely defoliated. Mr. Hunter was endeavoring to ascertain the sources from which the enormous numbers of these moths had come. He believed that in one case they migrated into the United States along the Mexican coast, and he raised the question as to whether another migration might not have taken place from the West Indies. In answer to this suggestion the Agricultural News says, "It does not seem likely that the West Indies could have furnished any large number of cotton moths during the past two or three seasons, as this insect has not been very abundant, in the Lesser Antilles at least." From articles in American periodicals the News tells of the capture of a number of moths of the cotton worm at Amherst, Mass., and the appearance of myriads of them in Philadelphia, on which Dr. Henry Skinner is quoted as saying: "There were many thou-

sands of them and nearly all that I saw were in perfect condition as though just from the chrysalis. These moths are known to migrate in numbers but it is quite strange if the great numbers seen here came from the cotton districts of the South. The moths in some places appeared to create considerable alarm, people thinking they would cause damage to plant life here."

The *Agricultural News* observes: "The fact that the abundance of the cotton worm has been observed in these northern latitudes, at the end of the season in which this insect has been so destructive in the South, might indicate that it occurs there as the result of migration directly from the cotton fields. On the other hand, the fact that the moths were remarkable for their perfection and freshness again raises the question as to whether the cotton worm has another food plant than cotton. The answer to this question would be of considerable interest to West Indian planters for, although uncultivated or wild cotton furnishes food for the cotton worm and thus helps it to survive periods when no cultivated cotton is being grown, it is obvious that additional food plants would be of value to the cotton worm during this unfavorable period." The problem thus raised would appear to be pertinent to the matter of the visitation Hawaii has experienced.

Clean culture is a living issue elsewhere than in Hawaii. Our tropical agriculture exchanges from opposite sides of the world—the Orient and the Antilles, as well as Europe—are devoting much space to insecticides and methods of their application, and admonitions to destroy all infected fruits are also becoming general.

Among the latest outcomes of governmental assistance in the marketing of small farming products in this Territory, in charge of S. T. Starrett, is the coöperation of dairymen in the Hilo district for the establishing of a central creamery to supply not only the local but the Honolulu market with fresh butter of first quality. In this connection it is interesting to notice, in a late number of the *Tropical Agriculturist* (Ceylon) a long selected article on the great development of the dairy industry of Denmark through the adoption of just such coöperation. It was instigated in that country by the failure, some years ago, of its corn-growing industry. Now Denmark is exporting millions of dollars worth of dairy products as the direct result of the coöperative creameries.

There is every promise, according to a news article in the *Hawaiian Star*, that Mr. Starrett's market superintending will eventuate in not only restoring the Hawaiian banana industry but developing it to an extent never before approached. One condition of success is of course clean culture, as well as clean and otherwise efficient packing, for which the superintendent is working hand in hand with the other official and private clean culturists.

Rubber seems to be the word everywhere in the tropical world just now, and Hawaii appears to have good promise of keeping its hand in the industry—comparatively small as the beginning here may be. Periodicals of tropical agriculture everywhere, as well as ordinary news prints in tropical countries, are giving much space to technical discussions of rubber growing. Last year, as readers of the *Forester* are aware, a number of this magazine was devoted mainly to a full report of the annual meeting of the Hawaiian Rubber Growers' Association, and it will also be remembered that the *Forester* has noted in exchanges, also in a book published in London, very considerable mention of the rubber growing experimentation done in Hawaii. Late mails have brought some articles on rubber, quotable in reasonable compass as well as many too lengthy for these pages, and of the former, as space will permit, our readers shall have the benefit.

KEEPING THE BOYS AND GIRLS ON THE FARM.

To keep the farmers' boys and girls in the country is a problem affecting every agricultural district in the United States. The universal opinion of the farmers throughout the country, as voiced to the National Country Life Commission was that the present system of education in the district schools in a large measure is responsible for the exodus of the youth of the country to the city; that the curriculum, owing to its failure to instruct in the spirit of the farm is strongly influencing the children away from rather than toward rural pursuits.

Recognizing fully the importance of the problem of conserving for the country a larger proportion of its young people and of directing them in childhood to appreciate the dignity and independence of farming as a profession, Secretary Fisher of the Department of the Interior has authorized the Reclamation Service to coöperate with the Department of Agriculture, the various state and county authorities, in a practical plan which it is believed will materially promote a solution of this problem on the irrigation projects of the government.

On a number of these projects the old-fashioned, one-teacher district schools have been eliminated and consolidated, or centralized graded schools have been established. Sufficient land has been set aside or donated adjacent to these schools to permit the platting of small tracts for planting. A course in elementary agriculture is to be taught and an actual demonstration of irrigation and cultivation is to be given with prizes for the best results. To further these plans the Reclamation Service will furnish free of charge the water for irrigation; the Department of Agriculture and the State Experiment Station will supply seeds and expert instructors. This western experiment will be viewed with absorbing interest by the farmers all over the land.

THIRD REPORT OF DIRECTOR OF FRUIT FLY CONTROL.

*To the President and Commissioners Board of Agriculture and
Forestry, Honolulu, T. H.*

GENTLEMEN:—I beg to submit a report of the work in re
"Fruit Fly Control" for the month ending January 31, 1912, viz.:

INSPECTION.

Upon request the President authorized me to engage two more inspectors at the beginning of January and in consequence I have been able to thoroughly inspect the areas covered by our outlying Districts 1 and 2 to the west and 7 and 8 to the east of Honolulu.

Last month I reported these sections as badly infested with fruit fly but am now pleased to report that strenuous destruction of infected fruits has shown a marked improvement in all these four districts. Continued inspection in all the precincts of Districts 3, 4, 5 and 6 has met with excellent results. Were it not for a few scattered residents who apparently refuse to coöperate in the clean culture methods adopted by your Board, and some others who throw all the burden of the work of picking and destroying infested fruit upon the inspectors, the present conditions would be still better than they are. On the whole, however, all the districts have been fairly well cleaned up of the ripe fruits, etc., of the season. Among these are principally the Hawaiian orange, Chinese orange, mandarin orange, guava, lime, loquat, carambola, fig, green pepper, coffee berry, kamani seed, papaya, eugenia and others. The mango season will be on very shortly, a number of trees already showing large size green fruit. Judging from the flowering and setting of the fruit on the mango throughout this island I should say that the crop is going to be an unusually large one. It will be interesting to see whether or not, because of clean culture methods, the fruit this year will show a diminution of fruit fly attack over that of last year. As previously stated, were it not that there are residents scattered throughout each precinct who cause continued inspection on their premises and fail to coöperate, the chances of re-infestation would be minimized. With such doubtful conditions, however, the re-infestation of small areas may, during the mango season, cause altogether unnecessary fruit fly conditions in adjacent sections. Many poor tenants of the smaller fruit and vegetable gardens have given us much extra work because of their inability to secure and pay laborers to gather and destroy quantities of infected fruits and vegetables. In such cases as these I have had to double up the inspectors so that these might assist such tenants in picking and carting away quantities of the infested material to the incinerator.

FINANCES AND PAY ROLLS.

Since my last report advices have been received from the State Horticultural Commissioner of California that the sum of \$4000 was available from his appropriation for the period ending July 1st for the purpose of employing inspectors. Your director has satisfactorily arranged with Mr. Weinland, the representative of said Horticultural Commissioner, a system whereby the expenditure of the California funds will be kept separate from that made from our own appropriation. An accounting from this special fund represented by the pay roll, will be forwarded by Mr. Weinland to the California authorities monthly. As it is particularly required that these special expenditures shall not include incidental expenses these latter will have to be expended from our own appropriation. The incidental expenses, which so far have been principally for printing, advertising and office supplies, will from now on be largely increased as it will undoubtedly be necessary to do considerable hauling of fallen fruit from certain districts to the incinerator. The districts referred to are of course those situated outside of the County garbage limits. In view of the above facts our own pay roll will show a proportionately less number of inspectors than that of California, but on the other hand the incidental expenses will, for a season, be much larger than heretofore. Since my last report two additional inspectors have been appointed, the total number on February 1st being 8. Five of these are on the California pay roll and three on our own.

BREEDING EXPERIMENTS.

Since last report the Entomological Department has succeeded in breeding the Mediterranean fruit fly from the fruit of carambola and brown persimmon. In the latter case a single fruit was handed us, it having been the only one maturing on a newly introduced species. The above fruits therefore may now be added to the long list of those which we have found to be attacked by Mediterranean fruit fly.

THE PEST ON HAWAII.

I am sorry to report that on the 31st we bred out the Mediterranean fruit fly from Chinese oranges which I received from a resident in the Kohala district on Hawaii. This is the first authentic knowledge we have of the absolute establishment of this fruit fly on that island although we have of course known that the common Melon fly, which has been in the Territory for so many years, was established on all the islands. The fact that the Mediterranean fruit fly is now already in one district and possibly in others on Hawaii will make the system of inspection at ports of destination a much more laborious one as "clean cul-

ture" methods, together with a systematic district inspection will have to be added to that which was originally contemplated. This also applies to Molokai and Kauai where I reported a while ago that the fruit fly had already become established. So far we have not received any questionable material from the island of Maui although it may be possible that the fly has established itself there as well as on the other islands. It is to be regretted that no funds were available to start the insular port inspection when it was first suggested by me two or three months ago. Failing a sufficient appropriation to efficiently carry out such necessary inspection work as was required to keep the other islands free from infestation I made an appeal to certain people who are largely interested in diversified industries on Maui and Hawaii with a view to having them "get together" and provide funds to meet the necessary expenses incurred for this insular port inspection. This appeal was made verbally and in writing some weeks ago but so far I have heard of no serious organization on the part of these agriculturists. As regards the infestation in the Kohala district I would state that I am writing to a prominent resident in that district informing him of the methods to be adopted to keep all fallen and infested fruit picked and thoroughly destroyed daily. I shall also ask him to give as much publicity to the instructions sent as is possible in a country district. It is quite possible that if the infestation is confined to Kohala and is of only recent occurrence radical measures such as stripping of all fruit trees including wild guava may delay its advent in other districts on Hawaii. Certain fruits sent us from Kona and Hilo have so far failed to breed out the Mediterranean fruit fly although there is one very questionable case which, when the breeding is complete, may prove to be an infestation of the Kona district. It is, however, somewhat early to predict on this particular case.

Respectfully submitted,

W. M. GIFFARD,

Honorary Member of Entomological Committee.

BOARD OF AGRICULTURE AND FORESTRY.

Minutes of a meeting of the Board of Commissioners of Agriculture and Forestry held in the Senate Chamber, Capitol Building, Honolulu, on Monday, January 8, 1912, at 2 o'clock p. m.

Present—Charles S. Judd, President and Executive Officer; J. M. Dowsett, H. M. von Holt and Albert Waterhouse.

Mr. Judd among divisional reports presented the supplementary report of Mr. Hosmer of the Division of Forestry in reference to the verbal application of Mr. Eben Low for an extension of time under his agreement with the Board to remove all sheep and goats from the island of Kahoolawe. After a general discussion in which it was stated that the weather at this season of the year might prevent Mr. Low from accomplishing the work within a shorter period and that the Board would prefer to allow ample time in order to be certain that all sheep and goats would be removed, it was moved by Mr. Dowsett that the extension of time be allowed to Mr. Low until April 30, 1912, to remove all sheep and goats; the motion was seconded by Mr. von Holt and on vote unanimously carried.

Rule on Rabies.

Mr. Judd presented Rule VI, which had been returned by the Governor with an alteration permitting the importation of dogs without quarantine restrictions from countries where rabies does not exist. Mr. Judd stated that the Governor had given as his reason for altering the rule that it would be unconstitutional unless such modification was made.

After a general discussion in which several changes of the rule were suggested it was moved by Mr. Dowsett and seconded by Mr. Waterhouse that the Committee on Animal Industry be directed to take the matter up with the Governor and ascertain in just what way Rule VI would be unconstitutional if passed without the change made by the Governor, and that the Committee on Animal Industry draw an entirely new rule which would cover all possible points and submit it at the next meeting of the Board. On vote the motion unanimously carried.

Rule on Thimbleberry.

Mr. Judd presented a draft of Rule XIII to control the plant pest, Thimbleberry, and read same to the Board. In general discussion it was decided that the rule should be drawn to restrict the carrying of the plant between any of the different islands, and upon motion of Mr. Dowsett, seconded by Mr. von Holt and unanimously carried, the President and Executive Officer was instructed to take the matter up with the Attorney-General and the Governor and prepare a sufficient rule and submit to the Board.

Fruit Fly Control.

The report of Mr. Giffard, Director of Fruit Fly Control, was presented by Mr. Judd and read. Mr. Dowsett and Mr. von Holt remarked upon the efficiency of the work and stated that in their opinion Mr. Giffard was to be specially commended. Mr. Dowsett said that the question of the State of California contributing to the funds for this campaign had not yet been definitely settled but it was hoped that money from this source would soon be available and that it would then be possible for Mr. Giffard to enlarge his working force and accomplish more than he could with present funds.

On motion of Mr. Waterhouse, seconded by Mr. von Holt and on vote unanimously carried the report was accepted and ordered to be filed.

Mr. Judd stated that the Forestry Committee was not ready to report upon the Forestry plan for Honolulu Plantation and would require further time.

Application to Cut Honohono Grass.

Mr. Hosmer stated that he had received an application from Mr. E. O. Farmm for permission for his brother, T. F. Farmm, to cut honohono grass on Tantalus. It was stated by Mr. Hosmer that some time ago the Board had prohibited the cutting of grass on Tantalus and it did not now seem advisable to allow it to be done. On motion of Mr. von Holt, seconded by Mr. Waterhouse and on vote unanimously carried it was decided to take the matter up at the next meeting of the Board.

Minutes of meeting of Board of Commissioners of Agriculture and Forestry, held in the Senate Chamber, Capitol Building, Honolulu, January 25th, 1912, at 2 o'clock p. m.

Present—Charles S. Judd, President and Executive Officer; Paul R. Isenberg, J. M. Dowsett, H. M. von Holt and Albert Waterhouse, members; R. S. Hosmer, E. M. Ehrhorn and V. A. Norgaard.

Honohono Grass.

Mr. Judd requested action of the Board regarding the cutting of honohono grass on Tantalus and after general discussion it was moved by Mr. Isenberg and seconded by Mr. Waterhouse that the former action of the Board prohibiting the cutting of honohono grass remain unchanged. Upon vote unanimously carried.

Mr. Judd presented a report of the Entomological Committee, dated Jan. 22, 1912.

ANIMAL QUARANTINE STATION AT HILO.

Mr. Judd presented a recommendation by the Finance Committee that owing to a lack of funds the building of the proposed animal quarantine station at Hilo be not undertaken during the present fiscal year, but that if possible a special fund be allotted for the purpose when the next regular allotments from the Conservation Fund of the Board are made.

Upon motion of Mr. Isenberg, seconded by Mr. von Holt and on vote unanimously carried the recommendation was adopted by the Board.

The Thimbleberry Rule.

Mr. Judd presented and read Rule XIII in full. Upon suggestion of Mr. Waterhouse and Mr. Dowsett slight amendments were made to the draft and on motion of Mr. Dowsett seconded by Mr. Waterhouse and on vote unanimously carried the amended draft was approved by the Board and the Executive Officer instructed to submit the rule to the Governor for final approval.

Fruit Fly Control.

Mr. Judd presented a letter which he had prepared to be sent to A. J. Cook, California State Commissioner of Horticulture, in regard to Fruit Fly Control work and asked the Board for its approval thereof. After a lengthy discussion as to clean culture and manner of enforcement of Rule XIII and the probable effect of action or lack of action upon the fruit industries of the islands it was moved by Mr. Waterhouse and seconded by Mr. Isenberg that the Entomology Committee take the matter up with full authority to act. Upon vote unanimously carried.

Rule on Rabies Adopted.

Mr. Judd presented Rule VI in final form and read same in full. Upon motion of Mr. Waterhouse, seconded by Mr. Dowsett and on vote unanimously carried Rule VI was approved and the Executive Officer was instructed to submit same to the Governor for approval and signature.

DIVISION OF FORESTRY.

Honolulu, Feb. 10, 1912.

*Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

GENTLEMEN:—I have the honor to submit herewith the routine report of the Division of Forestry for the month of January, 1912:

Forest Reserve Matters.

During the month I made several short field trips in connection with matters of locating forest reserve boundaries and fencing. The localities visited were Palolo and Nanakuli Valleys and the land of Aiea, Oahu, and that portion of the land of Kehena 2, Kohala, Hawaii, for which the Government has instituted condemnation proceedings. On this last trip, January 9-12, the party consisted of Mr. Arthur G. Smith, Deputy Attorney General, who is conducting the case for the Government, and Mr. L. von Tempsky of Maui, who went along to give expert testimony as to the value for ranching of the area in question.

Early in the month Mr. Haughs and I made a hasty visit with Mr. A. W. Van Valkenberg, to his forest plantation at Kunia, Oahu, where groves of a number of species of Eucalypts are making excellent growth. In time this plantation should yield large quantities of wood and timber.

During January progress has been made with a project to plant forest trees on the portion of the Government land of Aiea that lies within the Ewa Forest Reserve, the actual work to be done by the Honolulu Plantation Company under a coöperative agreement whereby the plantation will later be reimbursed in fuel wood for the money expended in the planting.

Plantation Tree Planting.

The Division of Forestry continues to send out considerable numbers of forest tree seedlings to sugar plantation companies and others doing extensive tree planting. Sixty-eight thousand seedling trees left the Nursery in January for this purpose. For further details in connection therewith Mr. Haughs' report, transmitted herewith, should be consulted.

Botanical Exploration.

Mr. J. F. Rock, consulting botanist of this Division, is still on Hawaii, where he is having a successful collecting trip in the districts of Kau and Kona. He writes that he has secured much additional herbarium material, including some very rare plants, and also that he has collected a considerable quantity of seed of native Hawaiian trees. This is particularly welcome news for these seeds can be used to very good advantage in exchanges with botanic gardens from whom we desire special favors.

Progress is being made on Mr. Rock's proposed book on Hawaiian trees. It is probable that the manuscript can be sent to the printer soon after his return to Honolulu.

Congressional Vegetable Seed.

During January, the Congressional seed received from the Delegate to Congress, was distributed to the public schools and to a selected list of persons on our mailing list. Some packets still remain which may be had upon application at the Government Nursery.

Street Tree Planting.

On the evening of January 30, I read a paper on "Street Tree Planting," before the Out Door Circle of the Kilohana Tree League, the members of which have taken up actively the question of civic improvement.

Very respectfully,

RALPH S. HOSMER,
Supt. of Forestry.

REPORT OF THE FOREST NURSERYMAN.

The following is a report of the principal work done during the month of January:

Nursery.

Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold | ... | 200 | 1400 | 1600 |
| Gratis | 450 | 1800 | 4435 | 6685 |
| | <hr/> 450 | <hr/> 2000 | <hr/> 5835 | <hr/> 8285 |

Collection on account of plants sold amounted to \$26.85. From the Division of Animal Industry for use of Animal Quarantine Station, \$32.25. Total, \$59.10.

Plantation Companies and Other Corporations.

We have received during the month orders for 12,000 trees and we have delivered 68,000, consisting of different species of Eucalyptus and Ironwood (*Casuarina equisetifolia*).

Experiment Garden, Makiki.

Owing to the heavy demand for trees during the past two or three months our stock for general distribution is considerably reduced, and the men at this station, also at the nursery, have been working on the potting and transplanting of trees to replenish our stock.

U. S. Experimental Planting, Nuuanu Valley.

The two men are kept busy hoeing and clearing away the grass from the trees. More trees are now ready at the Makiki Station for this work and these will be planted during February.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, Jan. 31, 1912:

*Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of January as follows:

During this month, we boarded 27 vessels and found vegetable matter on 21 of them and two sailing vessels brought sand in ballast which was clean and free from insect life. Careful inspection of all shipments was made with the following result:

| <i>Disposal with principal causes</i> | <i>Lots</i> | <i>Parcels</i> |
|---------------------------------------|-------------|----------------|
| Passed as free from pests..... | 610 | 17,809 |
| Fumigated before releasing..... | 32 | 420 |
| Burned | 31 | 176 |
| Total inspected | 673 | 18,405 |

Rice Shipments.

18,140 bags of rice arrived during the month and being found free from insect pests was permitted to enter the Territory.

Pests Intercepted.

Among a shipment of plants from Japan we found 100 orange trees which were badly infested with *Cladosporium citri*, *Aleyrodes citri* and a Tineid leaf miner, the trees were confiscated and burned. On a small shipment of Orchids and plants from Java we found some Mealy bugs (*Pseudococcus azalae*) which were killed by fumigation. Orchids from Manila were over carried to San Francisco and returned here during the month. We found the plants in a very poor condition, nearly all dead from dryness, nevertheless all the soil was removed and the lot fumigated. On another plant shipment from Japan we found many trees badly infested with the White Peach scale (*Aulacaspis pentagona*), a

large Lecanium scale, (*Eulecanium magnoliarum*) and some Brown velvet Lichen, all the trees were burned. Some cotton seed arrived by mail from the United States and was first fumigated before delivery as a precautionary measure against the Cotton Boll weevil (*Anthonomus grandis*).

Hilo Inspection.

Brother M. Newell, Inspector for Hilo, reports the arrival of 8 vessels, 4 of which brought vegetable matter consisting of 107 lots and 2331 parcels; which being free from pests were passed. One 50 bag lot of potatoes was ordered cleaned from soil before delivery.

Inter-island Inspection.

During the month of January 70 steamers were attended to and the following shipments were passed on:

298 bags of Taro.
57 cases of Plants.
5 bags Seed Cane.
2 bags Cocoanuts.

Total..... 362 packages.

The following packages were refused shipment:

28 packages of Fruits.
15 packages of Vegetables.
6 lots of Plants.
1 case of Lilyroot (not cleaned).

Total..... 50 packages rejected or destroyed.

On January 23 one package of grapes was found infested with maggots.

Respectfully submitted,

E. M. EHRHORN,
Supt. of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Feb. 7, 1912.

Hon. C. S. Judd, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to submit herewith the report of the Division of Animal Industry for the month of January, 1912:

Quarantine of Dogs.

The regulation imposing a quarantine of 120 days on all dogs coming from or through a country where rabies is prevalent received the approval of the Governor on January 27th and will go into effect on March 1st.

Pursuant to verbal instructions from the President of the Board I communicated with troop farrier Albert Davenport of Troop N, 5th U. S. Cavalry, who had been highly recommended to me for the position of caretaker of the Animal Quarantine Station. The increased duties of the incumbent of this position, which from March 1st will require the meeting of all incoming steamers and other vessels for the purpose of securing and transporting to the quarantine station all dogs intended for importation has necessitated the employment of a young and active man, and I am pleased to say that I believe the proper party has been found.

I took Mr. Davenport to the station and received from him valuable suggestions in regard to the construction of kennels, kitchen and infirmary for the care and keep of the dogs. I afterwards took him to the office of the president and various members of the Board but failed to find any of them in and as he had to return to Schofield Barracks on the afternoon train I requested that he report to me again as soon as he can obtain the required furlough. Mr. Davenport's retirement, though regretted, has been approved by his regimental officer, and his application has been forwarded to Washington for approval. In case the same should not be returned by March 1st the applicant is entitled to one month furlough for which application has already been made to take effect on March 1st. I feel therefore confident of having his services at the disposition of the Board by the time the rabies regulation goes into effect.

The construction of kennels and paddocks according to plans submitted herewith awaits the approval of the Board, and will be begun immediately, so that safe and comfortable premises may be in readiness to receive the dogs which may arrive after March 1st.

A light wagon with canvas top or hood, for the transportation of the dogs, and a horse to draw the same, will also be required, and the sum of \$400 or so much thereof as may be necessary for the purchase of the same is hereby applied for.

Annual Test of Dairy Cattle.

The third annual test of the dairy cattle of the City and County of Honolulu began on February 1st and will be continued from now on as fast as the work of the Division will permit. The first installment of 1000 doses of tuberculin was received from Washington on February 1st and is now being evaporated to a concentration of one-third of its original volume thereby making

it applicable to the intra-dermal test. This latter method of testing continues to give absolute satisfaction especially since a method has been evolved by this Division for the speedy retest of any questionable reactions. This consists in the injection—intra-dermally—in a fold of skin on the side of the neck of an equal dose of concentrated tuberculin, as that ordinarily injected into the sub-caudal fold. Owing to the thickness of the hide on the side of the neck there is little or no danger of the point of the needle penetrating the cutis, making the injection sub-cutaneous instead of intra-dermal. The neck region, however, is less accessible or convenient for injection under ordinary circumstances and the resulting reaction is less conspicuous, requiring palpitation or even accurate measuring in its interpretation. But where there is the slightest doubt about the result of a sub-caudal injection the neck injection should be resorted to immediately and an examination 48 to 72 hours later will dispel any doubt as to the diagnosis. This was beautifully demonstrated on a high priced Holstein bull recently imported which failed to give a characteristic reaction to the sub-caudal injection even though the local swelling indicated the possible presence of infection. The animal was then injected on the side of the neck and 50 hours later the double fold of the hide at the place of injection had assumed a thickness four times greater than original. This swelling was hardly noticeable so long as the hide was allowed to remain flat on the neck and only became conspicuously manifest when the hide was raised in a fold between the index finger and the thumb. With this neck test to assist in doubtful cases I feel absolutely confident that the intra-dermal form of the tuberculin test may be considered absolutely reliable as a means of diagnosing bovine tuberculosis.

Like in the former general tests the coöperation of the local Board of Supervisors, through the City and County Physician, has been extended through the assignment of Milk Inspector Richards to assist in making the tests. His personal acquaintance with all the milk producers and his intimate knowledge of the composition of the various herds has been of good value to us in carrying on this work.

Glanders.

I regret to report the appearance of glanders in a stable where the disease has been known to occur on previous occasions, but where no case has developed for more than two years. As this recrudescence of the disease after such a long interval is indicative of the presence on the premises of an old "carrier" of the infection—that is, an infected animal exhibiting no symptoms of the disease—it has been decided to test all the animals in the stable as well as such animals which have been in contact with these. This occasion will lend an opportunity to apply a new

method of mallein testing, the ophthalmic test, which in its way is as simple as the intra-dermal test for tuberculosis, but which is considered far more reliable than the old sub-cutaneous method, so much so in fact that it has already been officially adopted by several European governments. If it is proven to be as here there are strong hopes that the mallein testing of horses and mules for export to these islands may be extremely simplified and the objections of dealers and importers to this test be minimized.

Importations of Live Stock.

The approved report of the Assistant Territorial Veterinarian covering the importation of live stock during the month of January, as well as an itemized report on the tuberculin test of cattle is herewith appended.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

SUPPLEMENTARY REPORT OF VETERINARIAN.

Honolulu, Feb. 12, 1912.

Hon. C. S. Judd, President and Executive Officer, etc.

SIR:—Since finishing and distributing the monthly report of the Division of Animal Industry I have received a copy of the "Proceedings of the American Veterinary Medical Association," pertaining to the meeting held at Toronto, Canada, Aug. 21-24, 1911, where I had the honor to represent the Board as a delegate. The volume, covering more than 700 pages, contains much of interest to this Board, at least in so far as the Division of Animal Industry is concerned, including a paper presented by me on the livestock sanitary conditions in the Territory of Hawaii, which appears under the heading of "Report of Special Committee on Insular Possessions."

The purpose of this addenda is however to show the present status of rabies or hydrophobia in the United States and Canada in so far as the resident secretaries of the Association have reported thereon. It appears that reports were received from 23 resident secretaries, of which twelve only mention rabies, and of these again only two, both from New England states, report the absence of the disease during the past year. This does not indicate that rabies occurred in only ten States, but shows on the contrary, that the disease is on the increase in many localities, and in some cases to an alarming extent. Pennsylvania, for instance, made an appropriation of \$10,000 for the suppression of rabies (1911-1912), an increase of \$5000 over the preceding period

(1909-1910), and a number of other States now supply the anti-rabic treatment free of charge to resident citizens.

From these reports I beg to quote as follows:

Connecticut, p. 117: "No cases of anthrax or rabies have occurred since my last report."

Colorado, p. 119: "Rabies is on the increase and many cases have been reported from the laboratories of the state college and the university. No restrictions have been placed on dogs, save in one or two of the smaller cities."

District of Columbia, p. 121: "Rabies still occupies a prominent position upon the public stage. An almost continuous muzzling order has been in effect, but the hoped for results have not been obtained on account of the flagrant disregard by the police in general, of the enforcement of this order."

Georgia, p. 123: "Hydrophobia: This has increased alarmingly in the last year. The state health board distributes free the Pasteur treatment."

Massachusetts, p. 123: "During the year 1910 there were one hundred and fifty-four cases of rabies reported killed or died, a decrease of ninety-nine."

Michigan, p. 126: "On the optimistic side I am glad to say that so far as can be learned, Michigan is comparatively free from any serious contagious diseases. A few reports of *rabies*, glanders and hog cholera though not prevalent."

New York, p. 133: "New York has suffered during the past two or three years from a severe epizootic of rabies, but its progress has been noticeably checked by quarantining known infected areas and muzzling or confining dogs in such localities, in addition to the capture and destruction of such canines as are running loose and unmuzzled in violation of the law. Rabies at different periods during the past two years has appeared in twenty-nine counties in this state, one hundred and three townships, fifteen cities and eight villages."

Oregon, p. 139: "An epidemic of rabies prevailed in the Wallowa Valley, in a rather isolated section in the northeastern part of the state. No known fatalities occurred among the inhabitants although a number were bitten by rabid animals and received the Pasteur treatment. In most cases where animals were submitted for examination by the state bacteriologist the negri bodies were readily discernible. Coyotes became affected and menaced the entire live stock industry of that district. Sheep and small animals became affected to no slight extent, several thousand animals were exposed, radical measures were instituted and the disease was soon under control although danger still lurks in the presence of the infected roving coyote."

Pennsylvania, p. 143: "Rabies has been entirely too prevalent in this state. Twelve districts have been quarantined, affecting 2,746 animals. Those destroyed numbered 1,101 and 212 persons were reported as having been bitten. At the laboratory of the

state live stock sanitary board five hundred and twenty-seven head of animals were received during 1910, suspected of rabies. Of these four hundred and eight were from dogs, and *three hundred and thirty-five proved to be positive*. The brains of six cats, five horses, six hogs, three human beings, one mule, one sheep, one deer and one goat were examined, with positive results in fifteen out of the twenty-four cases. During the years 1905 to 1909 inclusive, the brains of seven hundred and thirty-one animals were examined with positive results in five hundred and fifty-six cases. These figures do not include any experimental animals."

Vermont, p. 153: "No cases of rabies have ever been reported in Vermont."

Wisconsin, p. 155: "Rabies:—There was a marked increase in the number of cases reported during the last year."

Wyoming, p. 156: "An outbreak of rabies occurred in the vicinity of Cheyenne during which two persons were bitten by rabid dogs, but prompt submission to the Pasteur treatment prevented any loss of life. Laboratory examination of suspected cases demonstrated the existence of the disease, which, followed by a city muzzling ordinance checked any further occurrence."

United States in General, p. 163: "Rabies continues to spread and is now found in nearly every part of the United States. In some localities it is suppressed by effective muzzling ordinances with destruction of all unmuzzled dogs found on the highways. The disease has not been so prevalent in most of the states in the western third of the United States as during the year previous but in the central states the condition has been more serious.

"There is a laboratory in Kansas City in which anti-rabic vaccine is prepared and sent out, not only for the purpose of vaccinating against rabies in persons, but also in animals. The price for the course of the treatment in persons is fifty dollars and in animals twenty-five dollars. A dose is sent each day. This laboratory is in charge of Dr. V. Nisbet. There may be other laboratories doing the same."

Canada, p. 164: "A few cases of rabies have existed in south-western Ontario during the past six months but the disease may be considered under control. No cases have appeared in other sections of Canada."

In regard to the intra-dermal method of tuberculin testing the following is quoted from the report of the Committee on Diseases:

"Dr. D. F. Luckey, state veterinarian of Missouri, is giving the intra-dermal test in cattle a practical test in his state work. The following is an abstract from a recent letter which I give with his permission: 'We begun the use of the intradermal test January last. We attempted to verify the results with subcutaneous test and further by post-mortem examinations. We had occasion to give this test a severe trial around Columbia and I am glad to report that it appears to be a decided success, especially, during the summer months. I believe the intra-dermal test will

prove more reliable than the subcutaneous tests. We have not hesitated to condemn cattle upon this test alone. Its accuracy depends largely upon the care in making the injection. We found that unless extreme care was used, the injection would not be properly made. In any animal with a bad history we injected both caudal folds. Age, pregnancy, recent parturition, excitement and weather conditions seemed to cut no figure with the test. Using it the veterinarian can do his work in daylight and does not have to wade about in filthy barns during the night. In making the tests around Columbia our men would ride all day, stop at different places, making the injections, and tagging the cattle. Anywhere from forty-eight hours to four or five days thereafter (usually on the second day) a re-examination of the same cattle is made with a view to recording the results of the injections. A little swelling sometimes follows from the insertion of the needle, but usually disappeared by the end of forty-eight hours. The swelling as a result of tuberculin reaction is usually well marked by that time and persists for about a week. As far as our observations have gone, there is a little uneasiness and switching of the tail noticed in tuberculous animals, beginning a few hours after the injection. There is exfoliation of the epithelium as the reaction disappears.'"

From the January number of the American Veterinary Review it appears that the Chief of the Bureau of Animal Industry has carried out the promised experiments with the intra-dermal test, as follows:

"The morning following * * * held in store for the visiting veterinarians * * * the inspection at the stock yards of about 140 head of cattle that had previously been tested under the direction of Dr. Mohler with the ophthalmic and intra-dermal methods,—a golden opportunity for studying the relative value of the two tests in question, and also their relative value as compared with the present (subcutaneous) tuberculin test." Unfortunately the results are not given in this number, but I have communicated with Dr. Mohler and asked for an advance copy of the report on the subject. Another paper, entitled, "The Newer Methods of Tuberculin Testing," by Dr. K. F. Meyer, director of the Pennsylvania Live Stock Sanitary Laboratory, has also been sent for.

Very respectfully,

VICTOR A. NORGGAARD,

Territorial Veterinarian.

FORESTRY AT THE SUGAR PLANTERS' MEETING.

At the annual meeting of the Hawaiian Sugar Planters' Association, held in Honolulu, December 4 to 7, 1911, more than usual attention was paid to the subject of forestry. On December 5, the chairman of the Committee on Forestry, Mr. Albert Horner, of Kukaiau, Hawaii, presented a report calling on the Association to take definite action in forest matters and recommending that certain specific projects be given the moral and financial support of the Association. These recommendations were later embodied in a resolution, which was unanimously adopted.

Mr. Ralph S. Hosmer, Territorial Forester, also addressed the meeting, emphasizing further the points brought out in Mr. Horner's report. As usual the report of the Committee on Forestry was distributed in printed form at the time of the meeting. Following are the remarks of Mr. Hosmer and the resolution adopted by the Association:

Members of the Hawaiian Sugar Planters' Association.

Mr. President and Gentlemen:—Arguments in favor of forestry and statements of reasons why such work ought to be done in Hawaii have been made so often before this Association that the subject is one familiar to you all. I do not come here today to re-thrash the old straw. But there are certain things that for the good of the Territory must continue to be said until the public sentiment that unquestionably exists here is crystalized into definite and positive action.

No speakers could ask for a more appreciative audience than is this association but, gentlemen, what is needed now is no longer mere polite attention and the formal approval of recommendations. It is high time that every plantation here represented should, in the terms of the street, "get busy" with forest work, and that at once.

The sole reason why this demand can be made here is that such work will pay. The plantation companies are long term corporations. They should and can afford to look well into the future. By the practise of forestry they will benefit themselves in many particulars.

This whole matter is purely a business proposition. The only excuse for the existence of forestry at all is that it is good business to use part of the land for raising trees. That it is good business so to do is proved by the experience of many nations, ancient and modern, so that indeed the degree to which forestry is practised has become a sort of yard stick by which the relative advancement of nations can be measured.

Here in Hawaii as elsewhere, wood and water are at the foundation of all our prosperity. We have given much attention of late to the right use of water, and properly so. Mr. Martin, the hydrographer, by dropping his current meter into your ditches

has given some of you figures that have set you thinking as to how to stop the leaks. But gentlemen, if you do not take adequate care of the forests that cover your water sheds it will take a very much more complex instrument than a current meter to record the alternate periods of flood and drought that in time are bound to follow the opening up of the protective cover.

Some plantations are of course already doing much in the way of forestry: others might very well do more. Especially ought there to be more and better coöperation between the plantations and the government in the protection of the native forests. It may be replied that it is the duty of the government to protect the forests. So it is. But here at once comes in the question of money, for the government cannot do work without funds any more than can the individual, and up to this time funds in adequate measure have not been provided for forest work.

A possible solution of this difficulty lies, I think, in the proposal that has recently again been brought forward, that the money now received from water revenues from forest reserves be used by the Government for forest work, instead of as at present going into the Territorial Treasury as a part of the general receipts of the Land Office. By turning this money that comes from the forest, back into the forest, the foundations can be laid of a self-supporting, revenue-producing forest system that in time will be one of the most important assets of the Territory. I urge upon the members of this Association that they use their influence to have brought about this adjustment of revenues.

If anyone wants to be primed with an argument, the reasons for this request are these: the continuance of the native forests on the water sheds in *good condition*, is essential to the maintenance of the local water supply. Our forests when exposed to grazing and trespass quickly become unhealthy and subject to destruction by insects and disease. The remedy is to maintain the forests in their original condition, or where it is necessary, to bring them back to that state. Essentially this means fencing and the removal of all live stock, followed where this may be required by the planting of blanks and open areas. This is work in which the Government and the plantation should coöperate, because on the right use of our waters, lands and forests, depends the prosperity of these Islands.

The second main need in forestry in Hawaii is tree planting on waste land. This is especially and immediately important on the sugar plantations because of the increasing cost of fuel, not to speak of other wood supplies. In view of what has been said so many times in former years, it is not necessary before this Association to enlarge on the advantage of having on each plantation groves of trees as a local source of wood supply. I desire merely to remind you that the offers of the Board of Agriculture and Forestry are still open: (1) to furnish advice as to what, where and how to plant, and (2) to supply at cost price seed-

lings of forest trees in quantity, ready for transplanting. By this method the plantations which for any reason prefer not to maintain forest nurseries of their own, are relieved of the trouble of getting the seedlings started, and also of much of the danger of loss, for the little trees, here offered, are not sent out from Honolulu until the danger from the "damping-off fungus" is past. As the Division of Forestry is decidedly limited in its equipment, it is advisable that orders for trees be placed some months in advance, otherwise it may not be able to supply the seedlings at the date required. It takes about six weeks to get eucalypts ready; two months for ironwood. The seedlings are sent out in boxes holding from 800-1000 each. The price per box, f. o. b. the wharf at Honolulu, is \$1.00 per thousand.

It is a very encouraging sign that during the past year tree planting has received a decided impetus in Hawaii, especially in the way of shelter belts for exposed cane fields and in groves for the production of fuel wood. But it is only a small part of what yearly ought to be done until enough forest plantations have been started to yield annually as much wood as is used on the several plantations.

Tree planting is a good investment—one of which the returns can be measured directly in dollars and cents. One of the best things about tree planting is that in this way there can be utilized land fit for no other purpose. For wind breaks near the sea ironwood has shown itself the tree to be used. For quick returns in fuel and wood production one of the eucalypts is usually the species to be recommended. In this connection I would remind the members of this Association that a few months since the Division of Forestry issued a bulletin on *Eucalyptus Culture* in Hawaii by Mr. Louis Margolin of the U. S. Forest Service, Mr. Margolin having been detailed to Hawaii upon special request to assist in this study. The bulletin is based on a careful investigation of all the available sources of information about eucalyptus in Hawaii. The Division of Forestry will be glad to send copies to anyone upon application. It will repay all plantation men to give this report careful reading.

In Hawaii it is impossible for anyone who has to do with the management of affairs not to be concerned with what has come to be termed The Conservation Program—the right use of lands, waters and forests. But as the whole conservation movement grew out of forestry, which must always remain one of its most important parts, so locally there is at the present time no way in which Conservation can be practised better than through forest work. My final word is that for the sugar plantation companies this means protecting the native forests and planting trees.

RESOLUTION ADOPTED BY THE HAWAIIAN SUGAR PLANTERS' ASSOCIATION AT ITS MEETING DECEMBER 6, 1911.

Whereas the subject of forestry is one of the most important

with which the sugar planters of Hawaii have to deal, because (1) of the close relation between forests and water supply and (2) of the constantly increasing need for local supplies of fuel and other wood, and

Whereas what is needed now is no longer mere approval but definite action, therefore, be it

Resolved, that it is the sense of the Hawaiian Sugar Planters' Association that the Trustees be requested to take definite and if possible favorable action, through a special committee or otherwise, on the recommendations contained in the report of the Committee on Forestry for 1911, to-wit:

(1) That there be introduced into Hawaii insect eating birds, such as shall have been approved by competent authorities as being beneficial.

(2) That financial assistance in the way of providing additional equipment be given by the Association to the Territorial Division of Forestry for its work of growing tree seedlings in large numbers for the use of those, especially sugar plantation companies, doing extensive forest planting.

(3) That it be brought forcibly to the attention of each plantation that it is the judgment of this Association that for their own interest and strictly from a business standpoint, the individual plantations ought to pay greater attention to tree planting and also to protecting the native forest by fencing in the areas from which the plantation draws its water supply.

Resolved Further, that this Association approves the adoption by the Territory as its definite policy, of the suggestion that as far as practicable the revenues derived by the Government from leases or licenses of waters flowing from the forest reserves be used for forest work; and that the Trustees be requested so to recommend to the appropriate Territorial officials.

FICUS STIPULATA.

(From Tropical Agriculturist.)

Ficus stipulata, better known horticulturally as *F. repens* (sometimes called "Mauritius Ivy"), is perhaps the best substitute we have in the tropics for the English ivy, which forms so delightful an adornment to gardens and country houses in Europe and other cool countries. In the tropics, where the ivy does not flourish, the want of a good wall creeper is often felt. Few walls, either of bungalows, estate buildings, churches, etc., which would not be greatly improved in appearance by the growth of a suitable creeper. This want is suitably supplied by the plant *Ficus repens*, as may be seen in the accompanying illustration, better perhaps than by any other tropical plant known. The plant thrives equally well at all elevations, from sea level to 6000 feet,—an uncommon quality which specially commends it to favor. It is

easily propagated from small cuttings of the rooting stems, and these have only to be inserted in ordinary light soil where they are intended to grow permanently. This should be done in wet weather, otherwise the cuttings must be kept shaded and watered frequently until they strike root, which may be known by the appearance of fresh growth. In a short time it spreads over the available surface, and it may be said to be seen at its best just before it completely covers the wall. Afterward it should be occasionally trimmed with a hedge shears, clipping off any straggling ends of branches, etc.

This plant is remarkable from the fact that although a perfect creeper, it belongs to a genus which is usually characterized by large trees or shrubs. Familiar examples of the family are the fig (*Ficus carica*), the Banyan, and the Rambong rubber trees—*Ficus bengalensis* and *Ficus elastica*, respectively.

Ficus repens occasionally bears an abundance of fig-like hard green fruits, which are not edible. The plant is considered to be a native of China and Japan, but is very similar to, if not identical with, *Ficus Thwaitesii* of Ceylon.

H. F. MACMILLAN.

NOTES ON SOME HONOLULU PALMS.—II.

VAUGHAN MACCAUGHEY—The College of Hawaii.

The Palmettos—Sabal.

There are seven groups of genera of palms indigenous to the continental United States, comprising ten species. Of these seven genera, the most widely known are,—the Silver Palms (*Thrinax*), the California Palms (*Washingtonia*), the Royal Palms (*Roystonea*), and the Palmettos (*Sabal*).

The name "palmetto" is of Spanish origin, being a modification of the word *palmito*, which is diminutive of *palma*, and means "a little palm." A number of the Sabals are quite small, with stems hidden below the soil, and to these the name may appropriately be applied. Any name, however, which is indicative of small stature, can scarcely be applied to the whole genus, for the best known species attain considerable size, having trunks several feet in diameter and thirty to sixty feet in height. Although unsuitable, the name palmetto is widely used, and will doubtless persist. The origin of the name Sabal is not fully known; it may possibly be one of the native names for the palmettos in South America.

The palmettos were originally confined strictly to the Ameri-

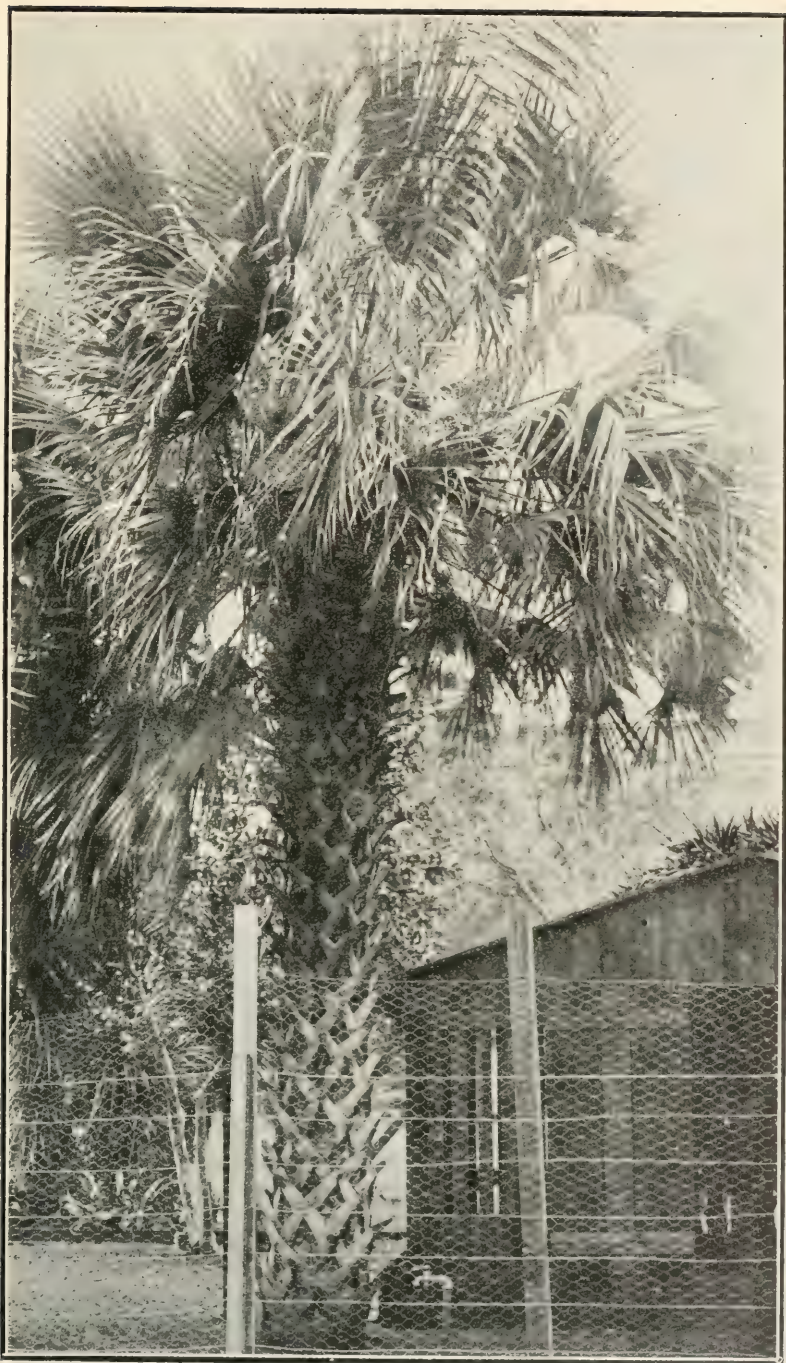


Fig. 1.
PALMETTO—Yard of W. E. Rowell. (Note arrangement of leaf bases).



Fig. 2.
PALMETTO—Government Nurseries.

PHOTO BY ROCK

cas, and were unknown to any part of the Old World. They were distributed naturally from the Bermuda Islands and the South Atlantic and Gulf States of North America through the West Indies to Venezuela and Mexico. It is of interest to know that the Cabbage Palmetto is the northernmost species of all the palms. The Sabals are now planted as ornamentals throughout many tropic and sub-tropic countries. Several kinds have been planted in Honolulu, and though not rare, they are by no means as common as some of the other palms.

The palmettos that are chiefly used for ornamental plantings are,—the Dwarf Palmetto (*Sabal Adansoni*), *S. mauritiaeforme*; the Cabbage Palmetto (*S. Palmetto*); Blackburn's Palmetto (*S. Blackburnianum*); the Mexican Palmetto (*S. Mexicanum*). The second and third of these have been most commonly planted in the Honolulu region. These five species may be distinguished by means of the following key, which has been adapted from Bailey's Cyclopedia of American Horticulture,—

- A. Leaf-blade longer than petiole.
 - B. Trunk none, the rosette of leaves springing directly from the ground.....*S. Adansoni*.
 - BB. Trunk of considerable height, finally attaining 60 feet*S. mauritiaeforme*
- AA. Leaf-blade shorter than petiole.
 - B. Leaf-blade heart-shaped in outline.....*S. Palmetto*
 - BB. Leaf-blade orbicular in outline.
 - C. Divisions of leaf rather rigid. *S. Blackburnianum*
 - CC. Divisions of leaf pendant.....*S. Mexicanum*

The notes that follow relate chiefly to the Cabbage Palmetto, but in many respects apply to the palmettos in general.

As was indicated in the discussion of the name "palmetto," there are two distinct types of Sabal,—(1) small, "stemless" species whose short trunks are buried in the ground; (2) species with stout, columnar trunks. The kinds planted in Honolulu belong largely to this latter class. The stem is covered with a red-dish-brown rind, but this usually entirely hidden by the peculiar and characteristic arrangement of petioles.

The leaves of the petioles, like those of the majority of palms, are tough and leathery, and their stalks or petioles are proportionately hard and woody. These tough petioles are persistent—that is, they do not drop from the trunk as do those, for example, of the Royal Palm. The leaves of the Royal Palm, when they have attained maturity, fall off entirely, leaving a smooth, ring-like scar. The leaves of the palmettos, like those of the date palm, persist for a long time. Finally the dead and withered leaf-blade drops away, leaving the petiole attached to the stem. The broad, concave bases of the petioles are gradually split open by the steady enlargement of the growing stem. This causes a

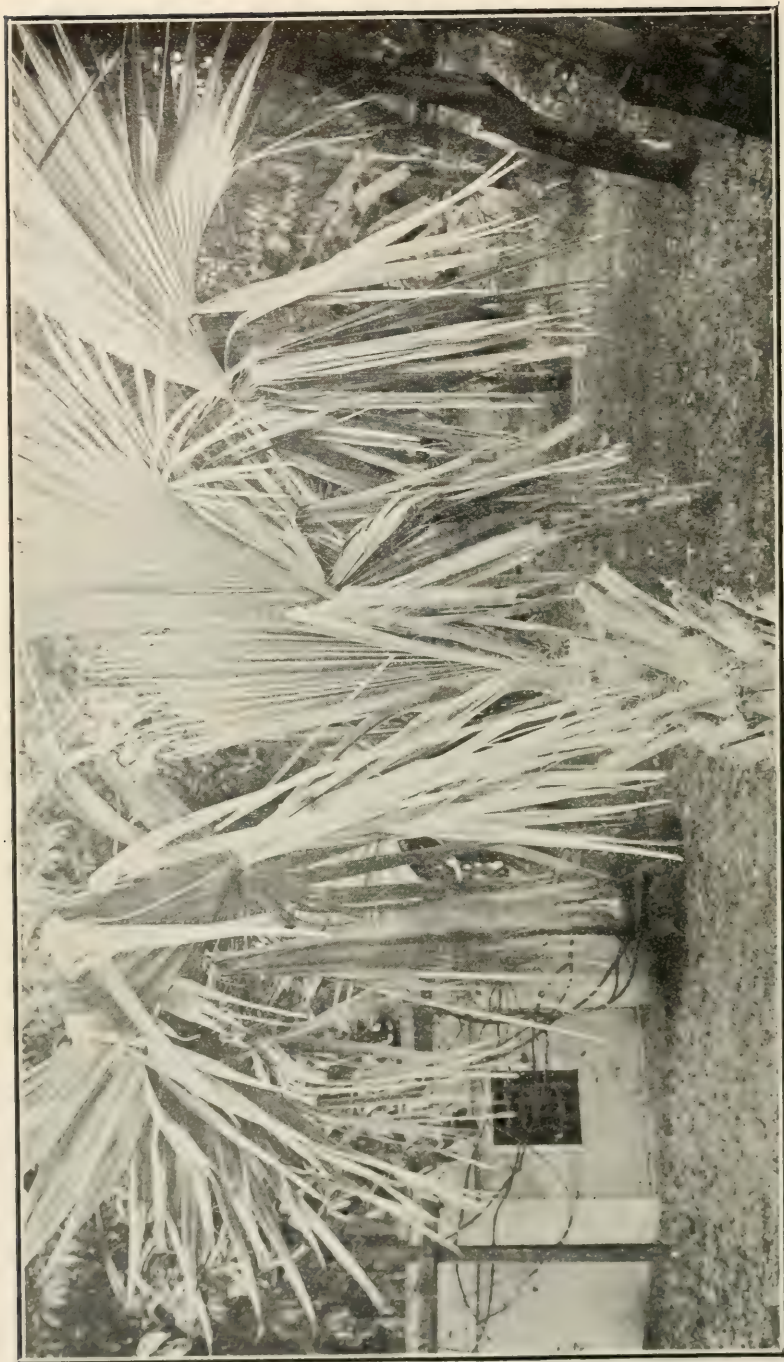


Fig. 3.
YOUNG PALMETTO--Kecaumoku Street

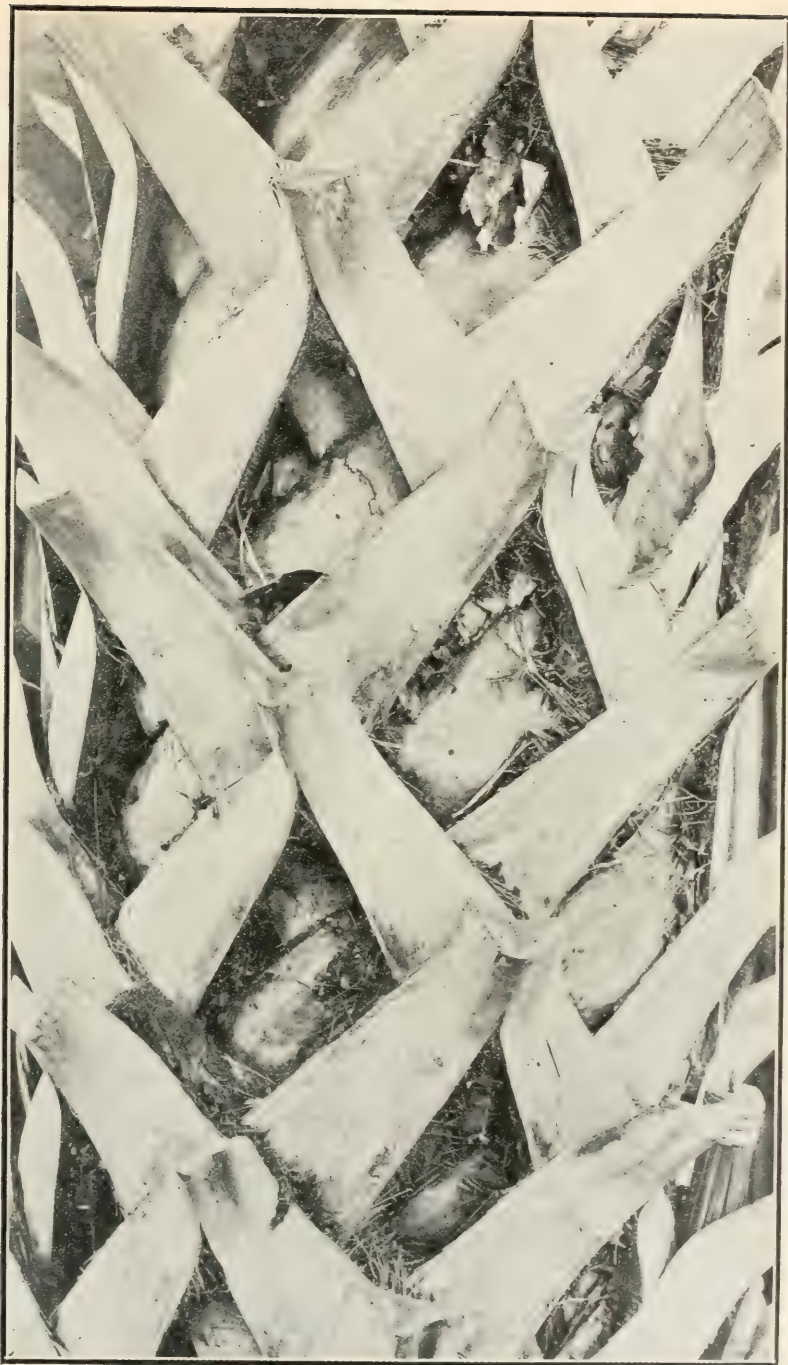


Fig. 4.
PORTION OF TRUNK OF PALMETTO SHOWING "BASKET WORK."

natural interlacing of the leaf-bases, and gives the trunk the peculiar appearance of being encased in a kind of regular basket-work (see Fig. —). This unique *chevreaux de frise* remains upon the trunk until the latter has attained the height of ten or twenty feet. (See Figs. 1, 3, 4.)

The underground portion of the stem is scarcely less interesting. It consists of a short, pointed, knob-like stem surrounded by a dense mass of contorted roots, this mass often being 4 to 5 feet in diameter and 5 to 6 feet deep. From it tough, light-orange-colored roots, often nearly half an inch in diameter, penetrate the soil for a distance of 15 to 20 feet. According to Seemann, "the roots contain a considerable quantity of tannin."

The wood is light, soft, pale-brown, with numerous hard fibro-vascular bundles. The outer rim is about two inches thick, and is much lighter and softer than the interior. The inner pithy portion of young trees is starchy and edible. In the Southern States the trunks are used, because of their great durability for wharf-piles. Polished cross-sections of the stem sometimes serve for the tops of small tables. The wood is largely manufactured into canes. Pieces of the spongy bark and stem are sometimes used as a substitute for scrubbing brushes.

Palms may be grouped in two classes, dependent upon the shape of the leaf,—feather-shaped or pinnate, including the date palm, royal palm, wine palm, and others; fan-shaped or palmate, including the silver palm, Hawaiian palms, and others. The palmettos belong to this latter group. The stout stem is surmounted by a crown of fan-shaped spreading leaves (see Figs. 1, 2). They are at first upright, then spreading nearly at right angles with the stem, and finally pendulous. The leaves are dark, lustrous green in color, and tough and leathery in texture. The blade is 5 to 6 feet long and 7 to 8 feet broad. It is divided into many narrow, long-pointed, parted segments or lobes. Each segment is folded at the base. The margins of these segments are often fringed with long threads. The midrib extends nearly to the center of the leaf. The petiole is 6 to 7 feet long, and has at its base a shining, chestnut-brown sheath of strong fibers (see Fig. 5).

The Cabbage Palmetto grows, as do all palms, from a large central, terminal bud. This bud is the "cabbage" of the palm, and because of its succulence and tenderness is cooked and eaten as a vegetable. The removal of this growing point of course kills the tree. Coarse hats, mats, and baskets are made from the light-colored immature leaves. From the sheaths of young leaves are obtained the bristles for certain kinds of scrubbing brushes (see Fig. 3). The mature leaves are sometimes used as thatch.

The flowering branches emerge from among the leaves. They are 2 to 2½ feet long, with many slender, incurved branches. These branches are profusely covered with small yellowish or

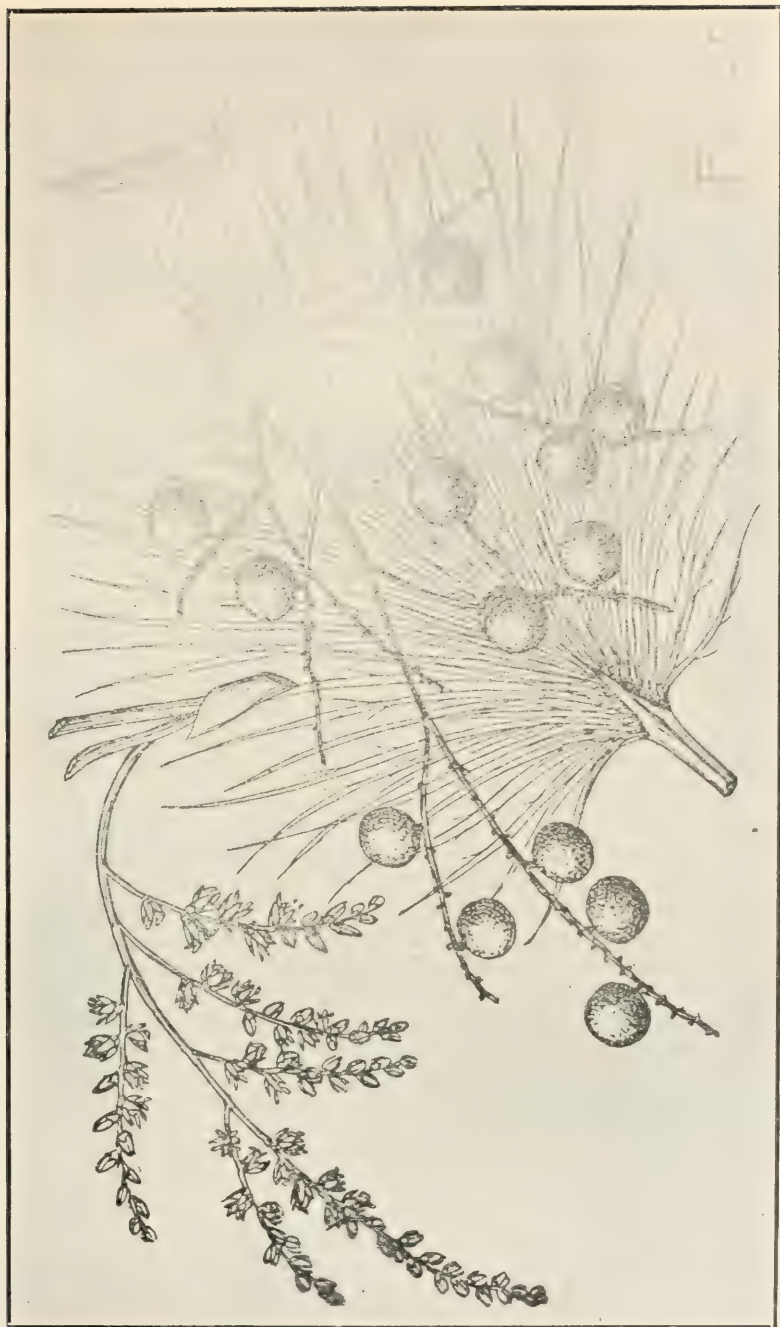


Fig. 5.
LEAF, FLOWERS AND FRUITS OF CABBAGE PALMETTO. (From Sargent's "Manual of the Trees of North America.")

greenish flowers. The fruit is a small, round, black, short-stemmed berry, about one-third of an inch in diameter. The flesh is thin, sweet, and dry; in its center is a single light-brown seed, about one-fourth inch broad (see Fig. 5).

In Florida, according to Rogers, "palmetto scrub is the bane of hunters, surveyors, and others who are obliged to go on foot through regions covered with the tough young growth of these trees."

Concerning the proper treatment of the palmetto, Mr. H. Nehrling, an authority on this group, writes in the *Cyclopedia of American Horticulture* as follows: "All the species that form trunks are objects of great beauty when well-grown. They need to be well fertilized, or the lower leaves will suffer and finally die, thus detracting much from the elegance of the specimen. They all grow naturally in rich black soil * * * they can hardly be fertilized too much, and the more nitrogeneous manure and water they get the faster they grow. When transplanted they must be set deep. * * * Make a hollow about 6 feet in diameter and about 2 feet deep in the center."

The Sabals are suitable for planting as individuals, in groups, and along small roadways. Their small stature and slow growth makes them unsuitable for ordinary street planting. These palms should have a more extended recognition by those interested in ornamental planting in Honolulu and Hawaii.

DUBOIS ON RUBBER.

James T. DuBois, recently United States Consul-General at Singapore and at present Minister to Colombia, is enthusiastic over the Philippine Islands as a future field for rubber production. A recent interview published in the *New York Sun* credits him with stating that the Philippine Islands south of the tenth parallel are as well suited to rubber culture as the Malay Peninsula. "I believe it the best in the world for the cultivation of rubber. In two months nearly a million rubber seeds were sent from our consulate to the Philippines, and in my opinion someday rubber is going to be one of the greatest assets of the islands." The big rubber territory of the Philippines covers Mindanao, Basilan, the Taw-Tawi group, Palawan, and Jolo, the home of the Sultan of Sulu.—*Mindanao (P. I.) Herald*.

BY AUTHORITY.

RULE XIII.

**RULE AND REGULATION OF THE BOARD OF COMMISSIONERS
OF AGRICULTURE AND FORESTRY CONCERNING THE CON-
TROL OF THE PLANT PEST THIMBLEBERRY IN THE TER-
RITORY OF HAWAII.**

The Board of Commissioners of Agriculture and Forestry hereby make the following rule and regulation:

SECTION 1. For the purpose of controlling and as far as possible of preventing the further spread of Thimbleberry (*Rubus jamaicensis*), called also Olaa Raspberry, and Hitchcock Berry, a plant introduced into this Territory at a point near Hilo, Hawaii, and now known to be established on various parts of the Island of Hawaii and in the Koolau and Hana Districts, Maui, which by reason of its habits of growth and ease of propagation has become in certain parts of the Territory a serious pest, especially on grazing land, all persons and corporations are hereby prohibited from carrying or shipping any plant, root, cutting, fruit or seed of the said Thimbleberry from one Island of the Territory to any other Island; *Provided, however*, that shipments of such Thimbleberry plants which are infected with a fungus disease may be made by duly authorized agents of the Board of Agriculture and Forestry for the purpose of inoculating healthy Thimbleberry plants with said disease.

SECTION 2. For the purpose of eradicating and preventing the spread of the *Rubus jamaicensis*, inspectors and other duly appointed agents of the Board of Agriculture and Forestry are hereby empowered to enter at all reasonable times any and all premises throughout the Territory where the Thimbleberry is known or believed to be growing, and such agents are also hereby empowered, if plants of Thimbleberry are found thereon, to seize and remove the same and to have them destroyed.

SECTION 3. Any person or corporation violating the above rule shall be guilty of a misdemeanor, and shall be punished by a fine not to exceed Five Hundred Dollars, as provided by Section 390 of the Revised Laws of Hawaii as amended by Act 82 of the Session Laws of 1905, and Act 112 of the Session Laws of 1907.

SECTION 4. This regulation shall take effect from and after the approval thereof by the Governor.

APPROVED:

W. F. FREAR,
Governor of Hawaii.

Honolulu, Territory of Hawaii,
January 31, 1912.



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 Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
 * First Report of the Board of Commissioners of Agriculture and Forestry, from
 July 1, 1903, to December 31, 1904; 170 pp.
 Second Report of the Board of Commissioners of Agriculture and Forestry, for the
 year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
 Third Report of the Board of Commissioners of Agriculture and Forestry, for the
 year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
 Fourth Report of the Board of Commissioners of Agriculture and Forestry, for
 the calendar year ending December 31, 1907; 202 pp.; 7 plates.
 Fifth Report of the Board of Commissioners of Agriculture and Forestry, for
 the calendar year ending December 31, 1908; 218 pp.; 34 plates.
 Report of the Board of Commissioners of Agriculture and Forestry, for the biennial
 period ending December 31, 1910; 240 pp.; 45 plates.
 "Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
 "Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables,
 etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

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- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
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- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. O. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
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- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
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- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
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MARCH, 1912

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RALPH S. HOSMER,
Superintendent of Forestry.

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To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications
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THE HAWAIIAN FORESTER *and* AGRICULTURIST

VOL. IX.

MARCH, 1912.

No. 3.

Another article of Professor McCaughey's series on Honolulu palms appears in this number.

Mr. Swezey's paper on insect parasitism, begun in this number, is interesting as well as instructive.

There is not a more interesting and important problem, if the subjugation of animal and plant distempers be excepted, pending in the Board of Agriculture and Forestry than that of the reclamation of Kahoolawe. Not only for the intrinsic profit of making the little island industrially productive, adding so much more to the limited area of arable land in the Territory, is the matter attractive, but the lessons of economical reclaiming and conserving that, with comparative cheapness and positive absence of appreciable risk of anything, may be learned from the experimentation necessary to the task will undoubtedly be of inestimable value in dealing with reclamation projects elsewhere in these islands. Mr. Hosmer's proposals in the matter in this number will be read with general interest.

Mr. Adams' plea for a secondary agricultural school is reprinted in this number from a daily newspaper. It is worthy both of study and preservation. The projected school of this character at Kahuku ought to be only the first of several in this Territory—one at least for each island being the minimum to work toward. There are two or three public and private schools in Hawaii which have for years been developing on the lines proposed, which bid far to attain to the standard contemplated for the Kahuku farm school. From all reports, in official periodicals and the news press, the Philippine Islands are forging ahead in agricultural instruction combined with other education, not only faster than Hawaii but bidding fair to establish models worth noticing by many states in the mother country. Teachers can not fail to be greatly helped in bending the pliant twig of youthful aspirations for life and livelihood on and from the soil by fully absorbing the sentiments and suggestions of Mr. Adams.

It is gratifying to note a fresh triumph of the new policy of marketing superintendency under the direction of Mr. Starrett. This is the development of an enthusiastic and productive interest in the growing of the Bermuda onion on the Island of Kauai. Some samples of the bulbs exhibited in town were a revelation to those seeing them. While the plans were all laid for making the Kauai output a new article of export to San Francisco for the off season in California, local dealers rose in arms so to speak and put a price on the onions for the local market which could not be rejected. So, while the home consumption keeps up with the supply, the growers are saved the ocean freight and all other attendant export risks upon their product.

Contributors, of whom the number is increasing in gratifying manner, may be implored to limit the length of their papers for this magazine. Its pages are restricted in number to fit the cost appropriation, and anyhow an article running beyond three or four pages must be interesting indeed not to be tedious to the average reader. It should also be known that the official matter, including that semi-officially requested insertion, nearly every month requires a large proportion of the available space. Since, too, the cause of agriculture in the schools has had the Forester made its organ, a problem of every month put up to the editor to solve is the due apportionment of space to the various subjects now germane to these pages. With the assistance of the president of the Board of Agriculture, however, it is hoped to effect a proper balance of all things before long. The growing importance of the Forester and Agriculturist, resulting from its widened scope, makes the necessity of its enlargement appear imminent. In the meantime the faculty of condensation should be exercised by all its contributors.

ROSELLE.

The roselle (*Hibiscus subdariffa*) which was introduced and distributed to a limited extent this spring by the Bureau, is making a most satisfactory growth at the experiment stations, and a good yield of fruit and seed for future distribution is expected.

The roselle is an annual related to the cotton and okra, and is probably the only plant in the world whose calyces are utilized for food. The plant flowers in October and the rapidly developing fleshy calyces are picked and used in making sauces, jellies, or jams, very similar in flavor to those made from the cranberry. A good wine is also made from the calyces. A very agreeable cooling drink may be made from the leaves and tender twigs, steeped in boiling water. In India the roselle is grown principally for its fiber.

The many useful qualities of the roselle and the ease with which it may be cultivated are sure to make it a favorite among all classes as soon as it becomes known in the Philippines.—*Philippine Agricultural Review*.

NOTES ON SOME HONOLULU PALMS—III.

 VAUGHAN MACCAUGHEY—The College of Hawaii.

The Slender Fan-Palms—Thrinax.

Thrinax is a Greek word for fan. The palms of this genus are characterized by their fan-shaped leaves and slender trunks.

There are nine or ten species of Thrinax, all confined naturally to the tropics of the New World. They are distributed from Southern Florida through the West Indies to the shores of Central America. They are now used as pot-plants and ornamentals in many parts of the world. The species that is common in the Honolulu region is the *Thrinax argentea*. Those grown in pots or tubs are young or stunted plants, and have little or no stem; those grown out of doors in the ground attain mature stature, with tall, slender trunks (see fig. 2).

The Thrinaxes are small palms, rarely over 15 to 20 feet in height. In the cultivated species there is but a single stem to a plant, the others either not developing or being pruned away. In the case of several of the wild forms, however, the palm sends up from the ground a number of stems, forming a clump or group. The lower portion of the trunk is marked by the ring-like scars left by the falling leaves; the upper portion is more or less clothed by the fringed leaf-sheaths. The rind, or outer layer of the stem is pale gray, almost as light in color as the rind of the royal palm. The wood is light and soft, with numerous small fibro-vascular bundles. The exterior of the stem is much harder than the spongy interior. According to Sargent, in the Southern States "the stems are used for the piles of small wharves and turtle crawls" (traps).

The leaves of Thrinax form a loose, graceful crown at the summit of the slender stem. The leaf-blade is orbicular. It is thick and firm in texture and is conspicuously folded or plaited, like a fan. The plaits or segments are separated near their ends, and the ends themselves are forked or split. The rind is either quite short or entirely lacking. At the center of the upper surface of the blade, above the point where the petiole is attached, is the conspicuous, elevated, concave ligule. While young it is lined with a silvery wool. This conical, pointed ligule is one of the characteristics of the Thrinaxes, distinguishing them from other palms.

The petioles are long, slender, and arched by the weight of the blade. In cross section a petiole is biconvex, and its margins are smooth. The leaves of palms are characterized by the peculiar and interesting sheaths that encompass the bases of the petioles. These sheaths are composed of stout, interlacing fibers, which form a coarse fabric-like material, and indeed are utilized as such by many semi-civilized peoples. The sheaths of the



FIG. 1.

Palmettos have been described in a preceding article. Those of the *Thrinaxes* are bright mahogany red in color, and are covered with a thick, silvery wool, which masks the true color of the slender, matted fibers (see fig. 1). The sheaths are relatively large, and clasp the stem instead of hanging loose like those of the cocoanut.



FIG. 2.

The characteristics of the leaves of the various *Thrinaxes* may be used to identify them. The following key is given by Mr. Jared G. Smith, now of Kona, Hawaii, in Bailey's *Cyclopedia of American Horticulture*. Mr. Smith has made an exhaustive and technical study of the palms, and his articles have been the source of much of the data given in this non-technical series. Mr. Smith's key to the ornamental species of *Thrinax* has been slightly modified.

- A. Under surface of leaves green.
 - B. Ligule with a blunt appendage at the middle. *Thrinax radiata.*
 - B.B. Ligule bluntly triangular. *T. Parvifolia.*
 - B.B.B. Ligule inconspicuous, truncate. *T. Barbadosensis.*
- A.A. Under surface of leaves silvery.
 - B. Leaf segments joined together at bases. *T. argentea.*
 - B.B. Leaf segments joined together for about one-third their length. *T. excelsa.*
 - B.B.B. Leaf segments joined together for about one-half their length. *T. multiflora.*

The flowering branches arise from among the leaf bases. They are long and slender, with numerous branchlets. The main axis of a flowering branch is clothed with thin, papery, tubular sheaths, split open along one side. The flowers themselves are small and are not brightly colored. The fruit is spherical, about the size of a pea, with a dark skin and juicy, bitter white flesh. The single central seed is thin shelled and brownish. Honolulu trees are commonly in fruit during April and May, the fruiting branches resembling gigantic clusters of small grapes (see figs. 1 and 2).

The *Thrinaxes* are widely used as pot or tub plants, and less commonly planted in the open. They grow somewhat slowly, but demand little care. Their graceful appearance and easy culture has given their great popularity, and *Thrinax argentea* is one of the more common of the small palms in the Honolulu region.

SUGAR, TEA AND COFFEE.

Some government statistics which have appeared recently throw light upon British tastes, and the extraordinary capacity of British stomachs in certain directions. Thus the amount of sugar we eat in one form or another is astounding. We import more than one-tenth of the world's production, which was estimated at 15,250,000 tons in 1910. Of the total product, more than half (8,600,000 tons) was cane sugar, and the rest beet. Of beet sugar, Germany produced 2,000,000 tons last year, and it is the semi-failure of the German crop that is mainly responsible for the sharp rise in prices. How serious this rise has been I may illustrate from the fact that it costs a laborer with sixteen shillings a week and a large family an additional sixpence a week. With sugar we naturally associate tea, and here again our consumption is enormous, amounting in 1910 to nearly 287,000,000 pounds. But why is coffee (the national drink of the United States) of so little account here? Our consumption of coffee last year was only just over 20,000,000 pounds, about one-tenth that of tea.—*Lucellum*.

RECENT INVESTIGATIONS IN INSECT PARASITISM.

BY OTTO H. SWEZEY.

(A paper read before the Agricultural Seminar, College of Hawaii, February 15, 1912.)

Insects as parasites have been known since the remotest times of human history. That insects, themselves, were parasitized by other insects was demonstrated in the later centuries, when close attention began to be given to biological studies. This gave rise to the familiar rhyme: "The little fleas which do us tease, have other fleas to bite 'em; and these in turn have littler ones, and so ad infinitum." Though not true of the flea, this idea is exemplified in many groups of insects that have been exhaustively studied in quite recent years.

At the first, let us ask, "What is meant by insect parasitism?" Parasitism has been defined as an association of two different animals, one, the parasite, living at the expense of the other, the host. Many of the parasites with which we are familiar do not kill the host outright, but live along with the latter continually, often for long periods of time, or acting only as an annoyance for shorter periods of time; as, for example, lice and fleas on our domestic animals.

On the other hand, when one insect parasitizes another insect, it usually results in the death of the host; as, for example, the Tachinid fly, which lays its eggs upon army worms and other caterpillars. When the egg hatches, the young maggot penetrates the body of the caterpillar, there living and growing by feeding on the juices and fat of the host, not attacking the vital organs till the young parasite nearly reaches its full growth. It finally does destroy sufficient of the vital organs as to result in the death of the caterpillar, which has all along been supplying the nutriment for its growth; then leaving the dead corpse of its host, enters the ground to finish its transformation to the adult stage.

A predaceous insect also causes the death of the insect on which it feeds, but it is a more sudden process; as, for example, when a ladybird beetle eats a plant-louse, it is a momentary affair. This illustrates the difference between insects that are parasites and those that are predators. However, the line between the two classes cannot be very accurately drawn. To illustrate: When the little Braconid fly stings and paralyzes a palm leaf-roller caterpillar, lays its eggs on the surface of the caterpillar, and these hatch and feed externally on the paralyzed caterpillar, in two or three days completing their growth, then spinning their silken cocoons on the leaf nearby, from which the adult insects emerge in about a week, we call this insect a parasite. But when

a certain black wasp catches these same caterpillars from the palm leaves, stings each one to paralyze it, and stores up half a dozen of them in a cell of its nest in which an egg has already been deposited, and the larva hatching from this egg eats all the caterpillars in a few days, we do not call the wasp a parasite; but speak of it as preying upon caterpillars. In each case, however, the caterpillar which is the victim is stung and paralyzed so that it remains in a living though inactive condition, until being eaten. In the case of the Braconid parasite, from one to twenty larvae occupy about three to four days in eating one caterpillar; while in the case of the wasp, its larva eats one or more per day of the paralyzed caterpillars stored in the cell for it. Apparently if one is a parasite, the other should be considered a parasite also. Neither of these quite answers to the condition of the definition of parasitism with which we started: that the host and parasite are *living* together, the latter at the expense of the former.

Among insects, parasitism is carried on in so many different ways that a general definition would have to be modified to fit many of the cases. This diversity is partially due to the transformations that insects pass through from the egg to maturity. Not so with all, but in general, from the egg hatches a larva, which may be a grub, maggot, caterpillar, etc., which eats and grows until attaining its normal size, then changes to the pupa stage, which is a quiescent stage externally, but very active internally, as many changes of structure take place, resulting in the formation of the adult insect, which emerges from the pupa in due time.

Now about insects, there are certain families and groups that are always parasites on other insects. Some of them are parasitic in eggs of other insects; some are parasitic on the larvae; others parasitic on the pupae; and yet others parasitic on adult insects. All, however, resulting in the death of the host, at least in the great majority of cases. All of these are called primary parasites. Now some of these primary parasites may themselves be attacked by parasites, and these in turn may also be parasitized, all of which are called secondary or hyperparasites.

Each parasite has its own method of attacking the host and its own peculiar development; so much so, that there are about as many different methods as there are different species of parasites; but for the more closely related ones the habits are often very similar.

With all this diversity of habits, it is small wonder that the study of insect parasitism is so fascinating and that entomologists of modern times are giving so much attention to it. Many an entomologist has been content to sit in his study or laboratory and write descriptions and classify parasites without giving the least thought to their habits; but to most entomologists nowadays the study of the habits of these parasites is of far more

interest, each one being in a way an unknown problem to be solved; for, unless each one has been studied independently, its host, habits, etc., cannot be definitely known, although they may often be approximately predicted if the habits of those closely related are known. Many insect parasites have been accurately studied, but of the great majority there is yet much to be learned.

Aside from the scientific interest taken in them, their economic importance in keeping insect pests in check has been another reason why so much attention has been given to parasitic insects the past few years. Whenever investigations are made of insect pests, one feature of them is the study of parasites, to determine if there are any in connection with the pest, and if so, how effective they are. If none are found to be present, investigations are made to ascertain whether there may be parasites on the same pest elsewhere which might be secured for use in this particular case. Thus there has been a great deal done in the way of introducing parasites from another country, and even from the opposite side of the world. This has sometimes been accomplished successfully; but has often resulted in failure. There are, however, many important examples of the success of the project, with some of which you are all no doubt familiar.

Among the first of these introductions of beneficial insects from other parts of the world, was the introduction to California of the Australian ladybird beetle which destroys the cottony cushion scale. This was accomplished by Mr. Albert Koebele in 1889, and although ladybirds are not parasites, it is an example of the same class of work. Mr. Koebele did introduce a parasite at the same time, however, but it was the ladybird that was successful and effective against the scale insect.

A familiar instance of successful introduction of parasites is the introduction of egg-parasites for the sugar cane leaf-hopper in Hawaii. These parasites were introduced from Australia in 1904 by Dr. Perkins and Mr. Koebele. The results are too well known to need rehearsing at this time.

A striking example of unsuccessful attempts to introduce effective parasites, is that of Mr. Geo. Compere, who for several years sought many parts of the world for parasites of the Mediterranean fruitfly, to introduce into Western Australia. He finally secured several species of parasites in India, which were successfully introduced into Western Australia, and at first were reported as very satisfactory. More recent reports, however, are that the parasites have not proved effective.

Many more examples could be given of successful introduction of parasites, and unsuccessful attempts as well. Economic entomologists the world over are becoming more and more interested in this aspect of insect parasitism; and numerous are the experiments now going on in the attempt to find and introduce parasites from one part of the world to another to assist in the warfare against insect pests. There is hardly time to treat of all

of them. Probably such work is being carried on at the present time on by far the largest scale in connection with Gipsy Moth and Brown-tail Moth control work in New England. As is well known, the Gipsy Moth has been established nearly half a century in New England, starting from a suburb of Boston and spreading out in all directions, until it is now present in the eastern half of Massachusetts, the northeast corner of Rhode Island, a large portion of southeastern New Hampshire, the southwestern corner of Maine, and a few scattered places in central Massachusetts and in Connecticut. The caterpillars defoliate most kinds of forest, shade and orchard trees and shrubs, and have threatened the destruction of all such in that region. The Brown-tail Moth, another European pest, occupies the same region, and has a somewhat wider range of distribution. The two together form a very serious menace in that region, and to the whole of the country as well, for they are continually spreading in spite of strenuous efforts to keep them in check.

Six years ago, work was begun on the introduction of the European parasites of these pests. Investigation has shown that they have numerous parasites in their native habitat, and that they are usually kept under control by them. Hence, their introduction to America was started and was already being done on an extensive scale in 1906. Hundreds of boxes of parasite material have been imported each year since then, mostly from Germany, France and Austria, also a considerable from Japan. This material consisted of egg-masses, larvae, and pupae of the Gipsy Moth; and winter webs, larvae, and pupae of the Brown-tail Moth. The handling of such a large quantity of material required a large number of cages, and insectaries, as well as an appropriately equipped laboratory. This was established in 1907, at Melrose Highlands, Mass., a suburb north of Boston.

From all this material, large numbers of parasites bred out, consisting of quite a number of species, and attempts were made to establish them in favorable localities. Some have succeeded well, others fairly, and some have probably failed, though how many will not be known for a certainty till later on. The latest report on the work gives an indication of what can be expected, and it looks very encouraging for some of them.

When studied in their native countries, these moths were found to have parasites attacking them in all the younger stages; one or more attacking the eggs; many species attacking caterpillars; and several attacking the pupae of their hosts. Many of these have been reared at the laboratory; some of them for a number of generations, as well as breeding them out of imported material.

Of the egg-parasites of the Gipsy Moth, one from Japan (*Schedius*), was reared through ten generations in one year in the laboratory, and several hundred thousand liberated; but apparently it failed to become established, or at any rate, not so well as it was at first expected that it would. It bred during the

autumn on gipsy-moth eggs, but failed to survive the rigorous New England winter.

The other egg-parasite of the Gipsy Moth (*Anastatus*) occurs both in Europe and Japan. Many thousands of this parasite were reared from imported material, and colonized in several places. Later investigations of these colonies showed that the parasites had established in most of them, and were dispersing slowly, and that as high as 29 per cent. of gipsy-moth eggs were parasited in some instances. This parasite only attacks the eggs soon after they are deposited and before any embryonic development has taken place. Its life cycle was found to be perfectly correlated with that of the Gipsy Moth, producing one generation per year the same as the moth. The first-mentioned egg-parasite, however, produces several generations per year, and they only attack the eggs after the young caterpillar has become fully formed within the egg, living in and destroying this young caterpillar before it hatches. That is, it is an internal parasite of an unhatched caterpillar. It passes through one generation per month, but apparently does not hibernate in gipsy-moth eggs, and needs another host to carry it through the spring till the gipsy-moth eggs are deposited in mid-summer.

Of the parasites on caterpillars of the Gipsy moth, many have been introduced, both Hymenopterous and Dipterous. Most of the Hymenopterous parasites were not considered important; but one Braconid (*Apanteles*) gave great promise in the ease with which its cocoons could be transported, being successfully carried from Japan in cold storage all the way. Many thousand were received alive, and from the adults emerging from them several colonies were established successfully. The adult of this parasite deposits its eggs (often many) inside a living caterpillar. When the young parasites are full grown, they emerge from the dead or dying caterpillar and spin their white silken cocoons in the immediate vicinity. Although so successfully established at first, yet the later reports are that this parasite can no more be found. They have hopes, however, that it will soon be found abundant; that it may have become widely scattered like some others that they have had, that seemed to be lost for a time on account of being so widely scattered that none could be found until they had increased greatly in numbers.

This species afforded opportunity for extensive investigations on hyperparasites. Thirty or more species of hyperparasites were reared from cocoons of this parasite imported from Japan. In shipments of cocoons of the same parasite from Russia, 20 to 25 species of hyperparasites were reared. After colonies of the parasite had become established, many of their cocoons were collected and these found to be highly parasitized. Eighteen species of American hyperparasites were found to attack this host, which has no doubt been a factor in its disappearance.

(Conclusion next number.)

A PLAN FOR A SECONDARY AGRICULTURAL SCHOOL.

Combining a broad view of education with a concrete idea of Hawaii's needs, Andrew Adams, manager of Kahaku plantation, made a notable address recently to the Territorial Teachers' Association. Mr. Adams was speaking on the plans for the secondary agricultural school at Kahuku, and made a forceful plea for a real trial of its merits. Mr. Adams' paper follows:

The Members of the Territorial Teachers' Association, Ladies and Gentlemen:

You have kindly permitted me to present to you the planters' point of view of the proposed establishment in Hawaii of a Secondary Agricultural School. I am credibly informed that Hawaiian planters are reputed to have evolved into autocrats of a sort. If this be so then it is possible that some of them, or of us rather, might be unwilling to delegate to me the authority to present the views of all. To avoid possible trouble therefore, permit me to slightly alter the title of my paper so as to limit my responsibility to presenting one planter's point of view.

It is entirely possible that some of the views which I shall present to you will be a repetition of the views of the other speakers of the afternoon, with mere changes in the phraseology of expression. Such a repetition will but serve to emphasize the fact that the interests of the teacher and the agriculturist are not incompatible, but, broadly speaking, are identical. Intrusted to each are natural forces susceptible of development into great productivity, always provided there is present in the mind and soul of the pupil and in the soil of the field that subtle constructive element or force so necessary to development.

The "Old-Style."

Familiar to us all is the picture of the old time pedagogue who expressed himself best in what Shakespeare called "three-piled hyperboles, spruce affectation, figures pedantical." Perhaps more familiar to us here is the sight of the old style plantation overseer who happened along from the ships in the harbor to try his hand at cane cultivation. I am speaking of classes, not of individuals. The community has come to insist that only such as have a natural inclination and particular qualifications for the work shall preside at the teacher's desk in the class room. In the final analysis there is no real place in the fields for the individual who has no real love of it. He is deficient in the larger view.

What has this to do with the establishment in Hawaii of a Secondary Agricultural School? You are teachers and understand the meaning of and appreciate the necessity for the larger view. For in your work and mine, inspiring us to sustained effort for its accomplishment, is the knowledge of that insistent human need of

intelligent, sympathetic guidance towards ultimate happiness and the common weal. Does happiness, then, exist on the sugar plantations of Hawaii? Not necessarily nor solely. Neither is it distinctively urban. There are, however, greater possibilities of its attainment by the large majority in the field than in the office or the workshop, for the very simple reason that, generally speaking, life is more natural in the field than elsewhere. Yet for several generations the drift of population has been citywards.

Figures to Prove.

I quote from figures compiled by Mr. William H. Rossit. The population of the world increased from approximately one billion in 1800 to about one billion and a half in 1900. In France, in that hundred years, a group of specified cities increased in population four hundred per cent. while the rest of the nation, exclusive of these cities, increased little more than 20 per cent. In England the population of the cities in 1801 was 25 per cent. of the whole, while in 1900 it was more than 50 per cent. of the whole. In the United States the population in the cities increased 100 times during the century while the remainder of the country increased only eleven times.

These figures are of great significance. I am not certain that the cause underlying this drift citywards is so much desire for urban residence through the belief that it is more advantageous, as it is the failure of the country to meet the needs of its population. Another significant fact has been revealed by statistical research. A large percentage of urban residents are temperamentally unfit for city life. Education is not responsible for this unfitness, although we hear much in these days of the tendency of modern systems to educate the people away from the soil. The agriculturist has not altogether fulfilled his obligations. He has not helped enough to open up the larger view.

This larger view need not include the ability to properly scan a line of Homer, nor to correctly render *kai gar* when it appears in the text, although that ability need not in itself prevent a tilling of the soil. It does include, however, the right of the individual to have offered him the kind of education which will stimulate his imagination, train his hand and eye, increase his self-respect and enhance the market value of his labor.

At the Bottom.

Right here is one of the fundamentals of the proposal before us. It is not altogether the negative purpose of giving an agricultural training to only such youths as fail to come up to certain specified requirements in the curriculum. It includes the positive purpose of shaping natural tendencies toward agriculture, of engendering a belief in the dignity of labor in general and of till-

ing the soil in particular. This belief needs no elaborate declaration of my profound faith in it. It is as old as history can record. Many of the old classical writers have left us a heritage of practical every-day advice on farming along with their poetry or the details of their adventurous expeditions. Our good friend Xenophon, for instance, was not always marching up a hill or marching down again on the other side. He was oftener in the fields with his laborers and his horses and cattle, for he was a practical farmer who loved the soil and his work. He has not only told us of the dignity of it, but has left rules for planting and other field operations that are wholly applicable today. Think of Varro, who at eighty years of age wrote a treatise on agriculture that is a standard work in these times. None of them knew the science of agriculture, but they all had a good measure of common sense, and Huxley says that "science is organized common sense."

Plantation Usefulness.

The establishment of a Secondary Agricultural School in connection with a sugar plantation will make it possible for that plantation to increase its usefulness to the community. It is needless to say that the sugar industry is in no sense an eleemosynary institution. If it were, the best development of the Islands would not follow. No community prospers when it or any considerable section of it is coddled by the more influential interests. The proposers of this school ask no gifts or special favors for it. Prosperity is inevitable, however, when each individual member of the community has a means of enjoying his privileges and recognizes his responsibilities. We have not yet reached the state when this recognition is altogether spontaneous. Not all adults possess it. It would be strange indeed if an untutored boy with no experience were able to decide along what lines lay his own best development and through what channels he could best reach the realm of his highest usefulness. It is just here that such a school as it is now proposed to establish can serve its best purpose. Its pupils will be given instruction in what goes to make up the fundamentals of education. They will receive training in intensive agriculture. They will receive pay for their honest labor. In other words, they will immediately take their places as producers in the community and will share in the benefits of that production. An increase in the self-esteem of the individual boy will follow his realization of his own powers and possibilities as a producer. The mantle of the dignity of labor will fall upon him—his own intelligent labor co-operating with the scientific training which he is receiving.

"Back to the Soil."

Perhaps some one will say that I am an optimist, an enthusiast—that if there is all this dignity and inspiration attached to agricultural labor, why is it that the fields are not thickly populated—why are all these abandoned farms in New England? So I am an optimist—without cheerful optimism, what would be our state of mind in these days when there is such a tendency to muckraking and the pursuit of gold and of fashion? So I am an enthusiast. I have cause to be. There is too much evidence of a good percentage of splendid results having come from just such schools as the one which it is now proposed to establish here for me to expect anything less of this. My observation has been that most men have in them a love of the soil which would have held them had they been properly trained before other calls became strong. One reason why the call of the city is so often irresistible is that the untrained, poorly educated tiller of the soil sees before him nothing but long years of ceaseless, wearying toil with few diversions. Labor presents to him no aspect of dignity. He sees in it just plain, every-day hard work of the common or garden sort.

To the youth grounded in scientific agriculture are opened up long vistas of possibilities. One of these is the certain increase in value of his labor commensurate with his increased efficiency. Not the least of these is the positive knowledge that he is the possessor of trained faculties which are instrumental in producing two spears of grain where one grew before. He comprehends the scheme of creation. He has the larger view. No man can deprive him of his knowledge or his efficiency. He is of definite, increasing value to himself and to the community. He has no desire to gain the unnatural procession cityward. He will stay with the soil and prosperity.

How do I know this? Look at Denmark. Fifty years ago its rural districts were so depleted of population and its cities so congested, with the consequent increase in the number of unemployed and in crime that its internal revenues were at an alarmingly low ebb and its municipal police systems had the utmost difficulty in preserving order. A system of scientific agricultural training was instituted on the farms. Today Denmark is called England's dairy. It supplies that country not only with milk and cream and butter but with eggs as well.

Textile Schools.

Look at the textile schools of Austria. "These schools were originally founded for the purpose of reviving special home industries which had become almost extinct," says A. S. Levetus, "and to create superior workmen fully equipped not only in their own

particular lines of work, but also in lines allied to it—to give the pupils some interest in life in the world lying beyond the school. The broad general aim is to train the pupils for practical life and love of work.” Recently the scope of the training has been enlarged. “The moral gain to the pupils of these schools,” says Levetus again, “is infinitely higher than the material gain, for the students are brought into close contact with the world without, and life becomes a bigger thing to them.” The larger view again. What is the practical result? Austria is today noted for the excellence of her textile fabrics and her people stay at home.

Then there is Tuskegee. Mr. John Graham Brooks tells the following story of one effort in that institution. To the professor of agriculture had come a lad whose attempts to meet even the lowest literary requirements of the school had failed. Could he be permitted to sit in the class for farming? Permission was granted. It was months before the instructor ever asked him a question. One day the boy came to the instructor and asked, in a shamefaced way, if the instructor would some time go out to see what he had tried to do. Out of objects that had been broken and thrown to the rubbish heap the boy had constructed a hot-house. From these piles of waste he had picked his glass, boards, roofing, window sash and piping. Empty tomato cans, old pails and abandoned lamps served him for furnace and heating tubes. He had invented cross-section boxes in which he could watch the root-development of the 40 to 50 thriving specimens in his different soil mixtures. The boy’s work was so good that the instructor sometimes brought his plants and boxes into the classroom to show what experimental science could do to turn the whole state into a garden.

It is not to be expected that all the pupils of the proposed Agricultural School will be possessed of faculties for original research work. But every boy will have a hand held out to him in his search for that mythical secret of the soil. He will be taught practical, scientific agriculture.

Is it worth while establishing such a school? I say emphatically, yes—for I have enough faith in human nature to believe that a fair proportion of the pupils of the school will become valuable workmen, even had I no examples of the success of similar institutions. Every boy who leaves this school with a good record will find immediate employment on the plantations or allied industries if he so desires. The planters stand ready to further any practical effort such as the proposal before us.

I may have wandered a little far afield. But, you see, there is the larger view.

I thank you for your attention.

RECLAMATION OF KAHOO LAWE.

At the meeting of the Board of Agriculture and Forestry held on February 12, 1912, the Superintendent of Forestry read the following report containing suggestions as to a method of starting the work of reclaiming the Island of Kahoolawe. No definite action was taken thereon at the time, but the members of the Board expressed themselves as in favor of the general plan outlined. The paper reads as follows:

Honolulu, February 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows a report outlining a plan for starting the reclamation of the Island of Kahoolawe, which I recommend be approved by the board and put into operation:

As pointed out in my report on the setting apart of Kahoolawe as a forest reserve, dated June 23, 1910 (Hawaiian Forester and Agriculturist, September, 1910, Volume VIII, No. 9, pages 264-267), the main object of that action was to place the island under the control of the department of the local government best equipped to accomplish its reclamation.

To bring Kahoolawe back to a productive condition will require considerable time and carefully directed effort. It is not the purpose of the present report to request any cash outlay for this work, but rather to suggest a plan whereby, under a system of licenses, the portion of the island that is now productive—the pili grass country along the lee coast—can be made to yield an increasing revenue that may be used for the gradual improvement of the remainder of the island.

The value of the pili grass section rests largely in the fact that algaroba trees are gradually coming up all over it. In time as the forest spreads it will be of much more value, for stock feed, for honey rights and for wood. The feed furnished by the algaroba beans and the pili grass is sufficient to carry a limited number of horses, provided they can get water. With some slight repairs the cisterns and the wells already on the island can be put into shape to supply enough water for from 100 to 150 head. By the construction of additional cisterns the number of head for which there is dry feed could probably be doubled. By licensing the use of this section for some such limited number of horses, for a short term of years, under definite restrictions, not only will algaroba seed be spread more rapidly over the land, but in addition some revenue can later be got which could be used in the inauguration of other lines of reclamation.

An extension of time has recently been granted Mr. Eben P. Low, whose lease of Kahoolawe expired December 31, 1911, to rid the island of the animals now remaining thereon.

Following the removal of all sheep and goats from Kahoolawe, the next most important thing is to encourage the spread of the algaroba forest. Under all the circumstances I believe that for Kahoolawe the most effective available way of accomplishing this end is by such a method as that just suggested.

Mr. Low has figured the matter out carefully and believes that by using hardy Hawaiian mares, accustomed to a rough range, he could successfully raise a strain of mule colts sufficiently good to meet a certain demand in the local market. He estimates that he could sell his colts for enough to justify him in making the repairs that are needed to put the wells and cisterns into shape and in complying with the requirements as to reclamation that would be demanded by the government. That the matter may be brought to a head, Mr. Low has made application that such a license be granted him and has submitted a prospectus showing how he would operate the business.

The question before the board is twofold: First, as to policy; second, as to details in the matter of requirements, were such a license granted.

As to policy: As a forest reserve Kahoolawe is unique. The island was so set apart that it might come under the control of the Board of Agriculture and Forestry, as being the territorial department best equipped to effect its reclamation. When, eventually, it is again rendered productive, the idea is to take the greater portion of the island out of the reserve and use it as may then seem best, under such restrictions as may be necessary, for various forms of agriculture. This being so, a radically different method of treatment from that followed in most of the Hawaiian forest reserves is not only permissible, but essential. There is no money in sight for such work as the reclamation of Kahoolawe, and even if there were it is doubtful, in view of the pressing needs of many of our native forest areas, if it would be wise so to use any large sums for this purpose. By such an arrangement as is here proposed this obstacle is overcome, the island being made to pay for itself, and to increase in value as it does so. With the fulfillment of the conditions made on the part of the board, I can not see, even if the licensee should be unsuccessful in carrying out all his plans, how the government could suffer, for whatever had been accomplished would be all to the good of the island. For these reasons I believe the board would be quite justified in granting a license of the character proposed.

As to terms: Any license to pasture horses on Kahoolawe should contain the following provisions:

A.—Regulation of the license:

(1) The number of head should be limited so as not to exceed at the start one hundred mares.

(2) The period of the license should be for five years, with the privilege of an extension, with a revised schedule of payments, for five years more.

(3) The government should reserve the right to grant, either to the original licensee or to others, additional licenses for the apiary privileges, for the keeping of pigs, or for any other uses not inconsistent with the horse pasturing license, for each of which additional compensation should be demanded.

(4) The cutting of algaroba trees for export to other parts of the Territory should be tabu, except as special rights were granted, for additional compensation, to the original licensee or to others.

(5) It should be required that reasonable care be exercised not to misuse or injure existing houses and other improvements and that all new permanent improvements should become the property of the government upon the termination of the license.

B.—Reclamation provisions:

(6) The licensee should be required to take all reasonable measures to police the island and prevent injury to government property through trespass by fishermen and others.

(7) Provide at least one laborer to work under the direction of the licensee's foreman, in accordance with an outline of instructions to be drawn up by the territorial forester, to collect and feed algaroba beans to the horses at designated places, to collect the seed-impregnated manure at these spots and carrying it with pack animals, systematically to place it at strategic points along all the gulches, so that the spread of the algaroba forest may be hastened in the places where it is most needed. Later, were additional laborers employed, they should put in part of their time on other planting work, as of trees and soil-binding plants on the upland, coconuts along the shore, etc.

(8) Have his employees read the four rain gauges now installed on Kahoolawe and make and transmit to the territorial forester such other meteorological observations and records as may from time to time be required.

(9) Have his employees assist, as far as they reasonably can, such agents of the Board of Agriculture and Forestry as may visit the island, especially by allowing them the use of horses and by providing them accommodations at their camps.

(10) Use every reasonable endeavor to rid the island of any sheep and goats that may have escaped at the time of the drives.

(11) Later, at the expiration of the five years term, it will probably be found advisable to require the construction of fences to shut off the pili grass area from the upper lands, on parts of which by then some of the native grasses will probably have re-established themselves. A provision covering such work could

well be inserted when the schedule of payments came to be adjusted at that time. For the present it is not necessary that such fences be built, but it would be a good plan if the licensee were required, upon request, to fence in small plots at such points on the mountain as might be designated by the forester for experimental planting. It could be specified that not more than a stated length of fence, say 1500 feet, would be required in any one year.

It is, of course, necessary that a responsible person be secured as licensee. For several reasons Mr. Low seems to be as satisfactory a man to take charge of this work as the Board is likely to secure. Having had experience with Kahoolawe, he knows the difficulties that must be met. He is already equipped with boats whereby the island can be reached. And he has a liking for Kahoolawe that causes him to regard such a proposition as the present in the same light as another man might look upon some other avocation.

Believing, then, that the government stands to gain from whatever reclamation work is done on Kahoolawe and that the program here proposed is one that will work out satisfactorily in practise, I recommend that the Board approve it and authorize the issuance of a license containing the provisions suggested.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

A METHOD OF TAPPING THE CEARA RUBBER TREE.

The Agricultural Journal of the Mozambique Company, Vol. I., p. 49, describes a mode of tapping the Ceara rubber tree (*Manihot Glaziovii*), which is known as the Lewa method, as follows:

The tree is fit for tapping when the rough and papery outer bark has been removed. If this has not been recently done, the surface may contain dirt conveyed up the tree by little ants, so it is therefore advisable for the tapper to carry a stiff scrubbing brush for the purpose of cleaning the surface. The portion of the tree to be tapped is then painted over with a weak acid solution—acetic, citric, carbolic or fluoric acid. The juice of citrus fruits, such as limes, lemons or oranges, or seeds of the baobab tree soaked in water, will also serve the purpose; but clean solutions only should be employed, and absolute cleanliness practised throughout. In the portion to be tapped, almost point-like incisions should be made, and the latex oozes out and flows down and coagulates in thin ribbons on the bark. These incisions should be made 4 inches apart, as each incision drains the latex

from 1 to 2 inches in every direction from the wound. An ordinary pruning knife is suitable, but every care must be taken that the incisions do not reach the cambium layer; a very narrow chisel or a flattened bradawl will also serve the purpose; but it is better to use a knife with a guard, to prevent the incisions from being made too deep. If the latex does not coagulate quickly, the acid solution is not strong enough. In damp weather the acid will be required to be stronger than in cold weather. The requisite strength will soon be found from experience.

Formerly, when the system was first started in German East Africa, the rubber was rolled off the tree into round balls. It followed, of course, that particles of bark and dirt became mixed with the rubber, and the product was consequently of poor quality. Latterly, however, this method has been improved upon, and instead of the rubber being rolled into a ball, it is now rolled off from the tree onto a small wooden roller in such a way as to form a sheet when cut from the roller lengthways. The latter method is a great advance on the method of collecting in the form of balls, as the tapper can from time to time dip the roller into a pail of water and wash off particles of bark and dirt, and subsequently put the sheet through a water.

The tapper should be provided with a rough scrubbing brush, acid, and a small hand whitewash brush, for applying the acid, a wooden roller about 6 inches long by $2\frac{1}{2}$ inches in diameter, and a pail or calabash of clean water. In addition to the tapper it is advisable to have a second boy to follow him to collect the rubber, for if too many trees are tapped at a time the rubber from the first trees will not be so easy to roll off. When rolling the ribbons off they should be distributed over the roller as evenly as possible. It is desirable that the sheets should not be too thick, so the rubber should be removed at intervals according to the desired thickness. The size of the sheets would vary, of course, according to the size of the roller used. It is desirable that the sheets should be of uniform thickness and size, so the rollers should be all the same size. The rubber should not be exposed to light more than is possible, so whenever the roller is not in use it should be kept in a pail of water, and the sheets that have been collected should also be kept in water and brought in from the plantation twice a day, after the morning and evening tapping.

It is stated that further experimentation is necessary before a definite opinion as to the merits of this method can be expressed.

THE SMOKE CURE FOR RUBBER.

Little is known in Java about the cure of latex by smoking, this being the primitive method adopted nearly a century ago by the Amazon Indians and still survives, in the treatment of wild-grown Hard Para. Dr. K. Goeter, writing to the Sumatra

Post, explains the Brazilian treatment of the latex, and goes on to say: "It is, however, most noticeable and, according to the experience of Trillat and other investigators, that wood smoke contains another substance (besides creosote) having strong conserving properties, namely, formaldehyde, which, dissolved in water, is the formaline or formal of commerce. It was therefore thought probable that this stuff would be found in small quantities in smoked rubber. This was, indeed, found to be so. With the help of various sensitive reactions, I could undoubtedly show the presence of formaldehyde in smoked rubber sheets so that by reason of this result it may be taken that the conserving work of smoke on rubber must at least be partly attributed to the presence of formaldehyde in the smoke. In the development of smoke, it would be well to bear this in mind, by endeavoring to get a smoke that is as rich as possible in formaldehyde. Now it has been found that organic substances, for instance, sugar, will, through incomplete combustion, produce more formaldehyde when they are placed in contact with metals. From this we may also conclude that smouldering wood in contact with a metal, such as iron, will give a smoke with a higher percentage of formaldehyde than when that contact with a metal does not exist. The wood must smoulder; therefore, it must burn without flame, and this is only attained by limiting the admission of air. If there is too much air, less smoke is obtained and more fuel is used up; so that it is less economical from two points of view. It might be well also for planters to bear in mind that in smoke a poisonous gas, the well-known carbonic oxide is formed, of which the relative quantity increases under the last-named conditions. From a hygienic point of view, the health of the coolies working continually in an atmosphere of smoke should be considered. Whether smoking has a direct influence on the physical properties, for instance, on the elasticity of the product, I should not dare at present to decide. As a fact, it can only be said now that smoked rubber keeps better and is not so liable to mould as unsmoked rubber. As a rule, a higher price is paid for smoked rubber on this account."

CULTURAL DIRECTIONS FOR PAPAYA.

By P. J. WESTER, Horticulturist.

The Philippines Bureau of Agriculture has issued the following directions for growing pawpaws which should prove of interest and be useful to Ceylon residents, says the *Tropical Agriculturist*. There are not nearly enough pawpaws grown in Ceylon.

SEED BED.—The seed bed should be prepared by thoroughly pulverizing the soil by spading or hoeing the ground well, and

the clearing away of all weeds and trash. Sow the seed thinly, about one to two centimeters apart, and cover the seed not more than one centimeter with soil, then water the bed thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, under a tree; or, it may be shaded by the erection of a small bamboo frame on the top of which are placed grass or palm leaves. If the seed is planted during the rainy season a shed of palm leaves should always be put up over the seed bed to protect the seed from being washed out and the plants from being beaten down by the heavy rains.

TRANSPLANTING.—When the plants have attained a height of about seven to ten centimeters, they are ready to be transplanted to the place where they are intended to grow.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leafblades should be trimmed off.

In transplanting, take up the plants with so large a ball of earth that as few roots are cut or disturbed as possible. Do not set out the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant; water thoroughly.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. It is well to set out three plants to each and as the plants grow up and fruit to dig out the males or the two poorest fruiting plants.

If the plants can not be set out in the field at the time indicated, transplant them from the seed bed to a nursery, setting out the plants about 20 to 30 centimeters apart in rows a meter apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters tall, the plants may be transplanted to the field from the nursery with safety after they are more than 1.5 meters high, *provided that all except young and tender leafblades are removed, leaving the entire petiole, or leafstalk, attached to the plant; if the petiole be cut close to the main stem, decay rapidly enters it.* If the entire petiole is left it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the petiole into the stem of the plant.

TREATMENT OF OLD PLANTS.—When a plant has grown so tall that it is difficult to gather the fruit, which also at this time grows small, cut off the trunk about 75 centimeters above the ground. A number of buds will then sprout, from the stump, and will form several trunks that will bear fruit like the mother plant in a short time. These sprouts, except two or three, should be cut

off, for if all are permitted to grow the fruit produced will be small.

SEED SELECTION.—Seed should be saved from the best fruits only. By this is meant not so much a *large* fruit as one that is sweet and well flavored, with a small seed cavity and few seeds; oblong fruit should be preferred to roundish ones in saving seed, as they grow on plants having both stamens and pistils in the same flower and these being, very largely, self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from roundish, melonshaped fruits, which mostly grow on female plants.

All male plants should be destroyed wherever they appear, as not only are they unproductive but by their pollen being carried to the fruiting plants they tend to produce degenerate plants when these are grown from the seed produced on plants growing in the vicinity of the male plants.

There is no need to fear that the other plants will not fruit if the male papavas are destroyed, for the reason that there are always plants about having *perfect* flowers and which provide sufficient pollen for the fructification of the female plants. This applies particularly to the Hawaiian papaya.

GENERAL REMARKS.—The papava is very impatient of water standing around the roots and should be planted only on well-drained land; being easily injured by strong winds, it should be planted in sheltered situations. Keep the land clean of weeds and the plants well mulched.

THE EFFECT OF THE SUN IN THE TROPICS ON ANIMALS AND MAN.

BY HANS ARON,

(Professor of Physiology in the University of Manila.)

The rays emitted by the sun may be divided into three groups: (a) the ultra-red or heat rays; (b) the visible or light rays; (c) the ultra-violet or actinic rays. Freer, Bacon, and Gibbs have investigated the solar spectrum in Manila, and find that its range on the ultra-violet side is not greater than in northern regions, but its chemical activity in July as gauged by its action on oxalic acid and uranyl nitrate is from five to twenty times greater than in Chicago.

Many observers have ascribed the peculiar effects of the tropical sun to the action of the actinic and light rays on the human body. The negative results of the experiments on the American troops in Manila with orange-red colored clothing as well as numerous observations made in the tropics by Aron have convinced him that actinic theory cannot be maintained.

In order to determine the effect of the sun's heat rays in Manila, Aron made a number of experiments, some of which are quoted below.

One thermometer was placed in the rectum of a dead dog, and another under its skin, and the body suspended in the sun. The thermometer placed under the skin very soon registered a temperature of $46^{\circ}\text{C}.$, while the one in the rectum showed a gradual rise due to absorption of heat. A living body absorbs heat in the same way, but a rise in the body temperature is prevented by the physiological mechanism for increasing the loss of heat.

A dog kept exposed to tropical sunshine soon suffers from acute discomfort, and its rectal temperature is found to rise from 38°C to $39^{\circ}\text{C}.$; a thermometer placed under its skin, however, shows a rise to $40^{\circ}\text{C}.$ or higher. Rabbits placed under similar conditions show a greater rise of temperature, the thermometer placed under the skin recording as much as $46^{\circ}\text{C}.$, but when these temperatures are reached the animals soon die.

The most instructive experiments were those conducted on monkeys (*Macacus philip.*, Geoff.). When a strong and healthy monkey is placed, so that it is continuously exposed to the sunshine, its temperature rapidly rises, and seventy to eighty minutes' exposure, even between 8 and 9 a. m. in December or January, is sufficient to kill it. If protected from the direct rays of the sun, it can be kept in the same place for any length of time without suffering any injury.

Normally the rectal temperature of the monkey is 0.5° to $1^{\circ}\text{C}.$ higher than its subcutaneous temperature. When exposed to the sun's rays the body temperature rapidly rises, but the subcutaneous temperature is always 1° to $2^{\circ}\text{C}.$ above that of the rectum. The immediate effect of shaving a monkey is to reduce its temperature generally, but the effect is more marked on the subcutaneous temperature. When shaved monkeys were exposed to direct rays of the sun, the rise in temperature and subsequent death took place more rapidly than in similar animals whose hair had not been removed.

That the animals exposed to the sun's rays died as a direct result of hyperpyrexia is shown by the following experiments. Monkeys were exposed to the sun's rays as in the previous experiments, but by means of fans a strong current of air was directed on to the animal's body. In spite of several hours' exposure under these conditions the rise in body temperature was only slight, and the animals remained healthy. A control animal exposed within a few yards of the first one, but not artificially cooled, died of hyperpyrexia in fifty-eight minutes.

In another experiment the body of a monkey was placed in a wooden box with perforated walls, which was again placed inside a larger one, leaving an air space between the two, so that

its head was exposed to the sun's rays, but its body was thoroughly protected by the ventilated air space and walls of the boxes. The monkey was kept in this position and exposed to the sun's rays from early morning till night without any rise of body temperature taking place, or any signs of interference with its health. The same animal was exposed under similar conditions to direct sun's rays for altogether fifty-four hours within a period of twelve days, and apparently suffered no damage. During this period temperatures taken in the hair on the animal's head were frequently found to register as high as 47°C .

Some observations were then made as to the effect of sun's rays on the human skin. White and dark brown skins were selected and their normal temperature carefully determined; this varied between 32.5°C . and 33.5°C . There was no constant difference between the two colors. When exposed to the sun the skin temperatures rapidly rose to 36.5°C . or 37°C .; on continuing the exposure there was no further rise of temperature, but on the contrary a gradual fall of 0.5°C . to 1°C . was observed. The fall usually began with the appearance of diaphoresis. The fall was more rapid and greater when active exercise was being taken and there was copious perspiration. If the man had been working hard and perspiring freely before being exposed to the sun's rays, there was only a slight rise of the skin temperature. Dark skins did not, so far as the experiment went, show quite so much rise of temperature as white ones. A possible explanation may be that the dark skin absorbs more heat rays at first, but in consequence the sweat glands come into action sooner, and so prevent the temperature from rising as high as in the case of white skins.

Although the effect of the sun's heat on the human body is neutralized by physiological action, this makes certain demands on the human organism. This is shown by one set of observations, in which persons lightly clad were kept at rest but exposed to the sun's rays; the result of this exposure was to increase the pulse-rate by 8 to 12 beats, and the volume of respiration by 23 per cent. Under similar conditions a Philippine weighing 57 kg. lost weight to the extent of 280 gm. in one hour, although no allowance was made for the perspiration absorbed by his clothes.

When active exercise is being taken the heat produced by muscular action added to that absorbed from the sun's rays may produce a condition of collapse.

BLIGHT-RESISTANT COFFEES.

Since the advent of the coffee blight (*Hemileia vastatrix*) into the Philippines some twenty-five or thirty years ago, it has been practically impossible to raise even a fair crop of coffee below 2000 feet elevation. This blight destroyed the coffee industry not only in the Philippines but in Java, Ceylon and the Malay Peninsula at about the same time that it reached this Archipelago.

An attempt is being made now by several of the old coffee countries to discover or create one or more varieties of coffee which will be resistant to this fungus, and it is believed there is some hope in some of the new hybrids of robusta coffee (*Coffea robusta*). This Bureau now has growing at the Linao experiment station a considerable quantity of this coffee, and a little later seed will be distributed to any one who wishes to experiment with the variety. However, like several of the non-commercial coffees this robusta does not have a first-class flavor, though it is in some respects better than that of either Liberian (*C. liberica*) or the Inhambane coffee of Mozambique. Another trouble with the new coffees is that they are for the most part very weak in caffeine, the active principal of the beverage—some of them possessing no stimulating qualities whatever.—*Philippine Agricultural Review*.

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THE HAWAIIAN FORESTER AGRICULTURIST

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APRIL, 1912.

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THE NEW PRESIDENT.

Mr. W. M. Giffard, the new president of the board of agriculture and forestry, was the first member to receive a commission when the board was organized under the act creating it. For some years he was out of the board, having resigned on account of pressure of business while manager of the late corporation of W. G. Irwin & Co., Ltd. It was during his former membership of the board that Mr. Giffard established the Hawaiian Forester and Agriculturist, being its editor for the first few years of its existence with the present editor as his assistant part of the time. Incidentally to his devotion to domestic arboriculture, which is well-known in Honolulu from the beautiful cultures wherewith he has always had his home surrounded, Mr. Giffard has long been an enthusiastic amateur in entomology, so much so that he takes rank among the professional entomologists. When formerly a commissioner of agriculture and forestry, he made a record as chairman of the committee on the division of entomology. A few months ago Mr. Giffard was induced to take the direction of the fruitfly control work, as an honorary member of the same committee. His management of the campaign thus far is familiar to the Forester's readers, who will find his latest report thereon in the present number.

RECORDS OF AYRSHIRES.

A report of the annual meeting of the Ayrshire Breeders' Association, held in January at the Manhattan Hotel, New York, has been received. The following data will be of interest to Hawaiian cattle raisers and dairymen:

"The report for the past year showed an addition of 91 new members, and a largely increased addition to the number of registered animals.

"In the mature class, Netherhall Brownie 9th, owned by Mr. J. W. Clise, Redmond, Wash., gave a record of 18,110 lbs. of

milk, 820.91 lbs. of fat, equal to 958 lbs. of butter, with 4.69 per cent. fat.

"In the three-year-old class McAlister's Betty, owned by Mr. Percival Roberts Jr., Narberth, Pa., gave a record of 14,208 lbs. of milk, 581.41 lbs. of fat, equal to 678 lbs. of butter, with an average of 4.19 per cent. fat.

"The average result of the advanced registry work during the past year was, 68 two-year-olds averaged 7610 lbs. of milk, 306.52 lbs. of fat, equal to 353 lbs. of butter, with an average of 4.04 per cent. fat.

"Thirty-six three-year-olds averaged 9318 lbs. of milk, 374.41 lbs. of fat, equal to 432 lbs. of butter, with an average of 4.14 per cent. fat.

"Twenty-four four-year-olds averaged 8723 lbs. of milk, 349.93 lbs. of fat, equal to 408 lbs. of butter, with an average of 4.12 per cent. fat.

"Ninety-seven mature cows averaged 9923 lbs. of milk, 332.03 lbs. of fat, equal to 442 lbs. of butter, with an average of 3.875 per cent. fat.

"The average of the whole, cows and heifers, is 8850 lbs. of milk, 351.21 lbs. of fat, equal to 408 lbs. of butter, with an average of 4.04 per cent. fat.

"The exhibit at the National Dairy Show was particularly fine, with five full herds shown by J. F. Converse, Woodville, N. Y., W. P. Schanck, Avon, N. Y., Ryanogue Farms, Brewster, N. Y., Branford Farms, Groton, Conn., and Willowmoor Farms, Redmond, Washington. The exhibit as a whole was of high quality and type, and attracted a great deal of attention.

"Perhaps the most conspicuous animals in the ring were Beuchan Peter Pan, imported and owned by Mr. J. W. Clise, of Willowmoor Farms, a bull that had never been beaten in the show ring, either in Scotland or America.

"The most sensational exhibit in the ring was the champion cow Oldhall Ladysmith 4th, owned by Mr. P. Ryan of Ryanogue Farms, Brewster, N. Y., who was not only champion and grand champion in her class, but also the winner of the \$500 silver trophy offered by Mr. John R. Valentine, President of the Ayrshire Breeders' Association, for the cow representing the most perfect type of her breed shown."

ARBOR DAY REMINISCENCES.

Someone has sent the Forester a clipping from the Sunday Advertiser's collection of events of twenty-five years ago, containing the following item:

"A meeting of the Royal Hawaiian Agricultural Society was held last evening. The date for the Stock Fair and Horticultural Show was fixed for next May. The desirability of establishing an 'Arbor Day' here was discussed at some length and it was arranged to communicate at once with the president of the board of education on the subject with the view of having a general holiday for school children established for this excellent purpose."

If recollection serves truly, the present editor of the *Forester* was one who agitated the institution of "Arbor Day" in Hawaii, if not the first one, having in the East before coming here taken an active part in "Arbor Day" exercises. As a representative of a press organization he assisted in planting a "press tree" on Montreal city hall square, upon an "Arbor Day" about thirty years ago.

TEACHING OF ENGLISH.

Professor M. M. Scott, principal of McKinley High School, delivered an address before the teachers' meeting, at that institution recently, on "Essential Points to be Emphasized in the Teaching of English."

After a few preliminary remarks on China and Japan and a comparison of the Chinese and Japanese languages with the English language, Professor Scott showed that these people failed to grasp the English language by not mastering the tenses of verbs, the plural of nouns, the sounding of the aspirate "th," final "t" and final "ed." He said that the problem in this country was the English problem and that if anything was to be accomplished in this mixed nationality the teachers must exert themselves to make the pupils speak good English and write good English. He suggested that the foundation be drilled into the pupils in the third and fourth grades of the primary; emphasized more in the fifth and sixth grades of the grammar and then smoothed off in the seventh and eighth grades so that when they entered the high school, the English language would be "jack-planed" for the high school teachers. "Teach them at the beginning when they get a little vocabulary to write and talk correctly. Children should not be taught from books alone. Have them write a sentence every day and then a paragraph. Mark the errors and put them on the board. First, pronunciation; second, tenses. Have them think what they wish to say and then speak it or write it."

Prof. Scott said that the teachers in the lower grades should insist on these points and the student would improve and then these difficulties would not be met with to so great an extent in the high school. The deficiency of so many of the students entering the high school this last year necessitated having a special

class in English every Wednesday afternoon in which they received such drill as should have been received in the lower grades. Prof. Scott remarked that even high school seniors continued to make these common errors, already mentioned, and the only solution to the problem was to constantly drill them in good English and insist on their using it in speaking and writing. He said the Chinese made the most mistakes, and second the Hawaiians and part-Hawaiians, who spoke Hawaiian at home. He asked that the primary and grammar grades do their part in preparing the students for the high school and then the high school teachers would do the rest.

Apropos of tree planting by sugar plantation companies, the suggestion made by Mr. James Gibb, manager of Honolulu Plantation, Oahu, at the annual meeting of the Hawaiian Sugar Planters' Association, is of interest as indicating the trend of opinion among plantation men. Mr. Gibb recommended that each plantation company set out one tree for every ton of sugar produced during the past year. As the total output for the Territory for 1911 was 566,821 tons, this would make a very creditable showing.

FRUITFLY CONTROL.

Honolulu, February 26, 1912.

To the President and Commissioners of the Board of Agriculture and Forestry, Honolulu, T. H.

GENTLEMEN:—As previously advised, the Mediterranean fruit-fly made its appearance in the North Kohala district on the Island of Hawaii during the latter part of January. In consequence of this and in order to prevent, if possible, its introduction into other districts of that Island, your director suggested that he and the superintendent of entomology visit Hawaii for the purpose of hastening the organization of committees to take charge of such campaign as might be found necessary. With the permission of the president of the board, I requested that Mr. Ehrhorn be sent direct to Kohala to investigate that district and to, if possible, secure data as to the limits of infestation. He was also requested to secure the organization of a special committee to handle conditions in such manner as any subsequent regulations of your board might make necessary. Mr. Ehrhorn's visit to Kohala and the result of his work and investigation are given in detail in his report to me under date of Feb. 20, a copy of which I beg to submit herewith. His report is self-explanatory.

The organization of campaign committees in the Hilo, Kau and Kona districts was personally attended to during a recent visit

to Hawaii. In Hilo the matter of organization for that district was handled by the Hilo board of trade at a meeting held on the 7th inst. At that meeting I fully explained the situation in so far as the district of Hilo was concerned and outlined a plan of campaign to prevent, if possible, the introduction of the pest from adjacent districts, as well as from the port of Honolulu or any other infested ports in the Territory, which Hilo was in communication with. The whole matter was thrashed over with the members of the board of trade and they were assured of the coöperation and assistance of the Territorial board of agriculture in any campaign they might efficiently organize. The result of the Hilo meeting was that a committee of five members were appointed to handle the situation there, consisting of A. Lindsay (chairman), H. V. Patten, E. F. Nicolls, D. S. Bowman and Brother Matthias.

From Hilo I proceeded to Kau and Kona and in both of these districts I met the prominent members of local organizations and explained matters to them in the same manner as I had already done in Hilo. In Kau Messrs. W. G. Ogg and C. Wolters promised to handle the campaign, and in Kona three members (Messrs. Macfarlane, Curts and Wallace) of the executive committee of the Kona Improvement Club also assured me that they would keep in line with what was done in the other districts of Hawaii. The Kona coffee growers appeared to be somewhat worried (and rightfully so), because of the possibility that the fruit-fly pest might be brought into their district from Kohala by road conveyances coming from the latter district and were anxious that any regulations formulated by the Board would include the prohibition of all Hawaiian fruit from any section of North and South Kohala, in addition to the seizure and destruction of any which might be landed at any of their ports. I assured them that the object of the board of agriculture was that any regulation passed and having force of law would not only provide for the conditions which already existed in Kohala but also would, as far as was possible, protect the other districts of the island against the introduction of the pest by way of both ports and public highways. The organizations in all the above-mentioned districts have been informed in a like manner.

Before leaving Hawaii I gained the impression that each of the organized committees would endeavor to secure funds either through the county supervisors or by private subscription, or both. The general opinion prevailed, however, that the Territorial government should, if at all possible, assist financially in their campaign and I would therefore suggest that this important question be taken up by your board at an early date.

Since my return from Hawaii I have communicated with the agents of the several plantations located in the Hamakua district and have asked for their assistance and coöperation in getting the managers together and forming an organization to

manage the campaign in that section and quarantining it against North and South Kohala, in so far as the introduction of Hawaiian fruits are concerned. The ports of Hamakua are to be included in any organization of inspection the same as the ports in other districts are intended to be.

As regards the transportation of any Hawaiian fruit by means of the belt roads leading out of the Kohala district, so far as I could learn from the committees in Kona and Kau more particularly, it was the intention to have gates placed on these at certain points of entry and there hold up and inspect all conveyances and, if necessary, seize and destroy all Hawaiian fruit which may be found in these.

As a result of correspondence with the Maui chamber of commerce, it has been learned that that body has already organized a campaign to prevent the introduction of any Hawaiian fruits at its ports of entry. So far as is at present known, the Mediterranean fruitfly is not yet established on Maui, but it will not be long before we hear of its establishment there unless the most rigid precautions are taken against the entry of any Hawaiian fruits at its ports. In addition to its weekly importations of freight and passengers from Honolulu, it has the further disadvantage of having almost daily intercourse with its neighbor, Molokai, by means of sampans and other small craft. Any new regulations passed by your board should, therefore, make it prohibitive for Hawaiian fruits to be shipped or taken on any inter-island carrier when said carrier is plying from any infested to a clean port of entry.

Immediately upon my return from Hawaii, I took up the matter of the necessary regulations with your president and the attorney general and the latter is now formulating such as I trust will not only meet with your approval but will also meet present requirements on the islands of Hawaii and Maui. As soon as you have adopted these regulations and have given them the force of law by the Governor's approval, I would respectfully suggest that the necessary authority be given to issue commissions to all the members of the organized committees on the islands of Maui and Hawaii, as well as to the inspectors which the said committees may officially appoint.

In conclusion, I desire to say that whilst a *rigid, efficient and continuous* method of inspection, seizure and destruction of all Hawaiian fruits, vegetables, etc., at any ports of entry, and, where necessary, along any belt roads on any island or in any district not at present infested with the Mediterranean fruitfly pest may prolong the period of immunity, it is my candid opinion that there will always be an element of danger of infestation because of the failure of inspectors to appreciate the grave danger in allowing or accidentally passing a single Hawaiian grown fruit of any kind whatsoever in the belongings of any passenger or in freight packages. Again the possibility, at some future time, of the

fruitfly migrating from one district to another by means of a continuous forest belt as prevails in some districts on Hawaii is not to be ignored. It is well known to entomologists that much of the Hawaiian or indigenous flora in the mountain regions on these Islands produce fleshy fruits which are just as liable to infestation as those of the kamani, which flourish on the lower elevations. The fruit of the kamani has but little fleshy material in it, yet we know it to be very badly infested in sections where the fruitfly has become established. The same may be said of the pulp of the coffee berry. The guava in a wild state, as is known to exist at even very high altitudes, is the greatest menace we have on all the islands in the Territory because of its well known adaptability for the reproduction of fruitfly. Like Oahu, there are districts on Hawaii and Maui where, because of the large areas of wild guava, it would be next to impossible to either eradicate or use any practical methods of culture were the pest once established in that region. Kohala on Hawaii I believe has to some extent the conditions I speak of and it will be the sheerest luck if its committee succeeds in exterminating the fruitfly, notwithstanding that it is said to be established as yet in only a comparatively small area. Hamakua, Hilo and Kona have similar conditions on the mountain slopes up to a fairly high elevation, whilst Kau, I believe, is somewhat more fortunate in the above respect.

Preventive natural conditions are certainly almost ideal in the districts of Kona and Kau, in so far as the introduction of the fruitfly from other adjacent sections, as there, there are either extensive aa flows or sand deserts which are practically, if not altogether, bare of vegetation, and which, as barriers, should naturally protect these districts. The infestation in Kau and Kona, therefore, will almost altogether be made possible only by the introduction of Hawaiian fruitfly by means of the various ports of entry in these districts or by means of transportation (autos or wagons) along the belt road leading from Kohala on the one side or Hilo on the other.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, Board of Agriculture and Forestry,
Honolulu, T. H.

FOURTH MONTHLY REPORT.

Honolulu, March 4, 1912.

To the President and Commissioners, Board of Agriculture and Forestry, Honolulu, T. H.

Honolulu Fruitfly Control.

GENTLEMEN:—I beg to submit you a report of the work of

this department for the month ending February 29, 1912, viz:

Inspection. Since the beginning of February there have been eight inspectors employed to cover all the districts and precincts within the quarantined area extending from the western boundary of Waialae to the eastern side of Moanalua, but excluding the "heights" and valleys back of Honolulu. These latter sections will from now on receive as much attention as prevailing conditions and the small working force will allow.

General Conditions. These I am pleased to report are much more satisfactory than they have yet been. Considering that up to a month ago only four inspectors were available under the financial conditions then prevailing, it is gratifying to find that the present fruit and pest conditions are so satisfactory. The addition of four extra men in February, made possible through the financial coöperation of California, has helped very materially in cleaning up many infested sections which could not previously be satisfactorily attended to. Continuous daily and systematic inspection of the various precincts and the coöperation of the large majority of householders have very materially assisted in ridding the whole quarantined residential section of infested fruits. These must not, however, include the mango, which is now coming into full bearing. As a whole, I should say that the present infestation is very much less than it was during last summer before the campaign started. In previous reports I mentioned the lack of coöperation on the part of many citizens, who failed to respond when called upon to strip their trees of ripe or overripe and infested fruits. These householders, although comparatively few in numbers, have caused much extra work and have also been the cause of repeated inspections on the part of inspectors. Many have had to be continually reminded of the penalty called for by the regulations. Fortunately the department has been able up to this time to cope with the situation without having recourse to the courts, although it may be that one or two delinquents may shortly make it necessary to bring about such an undesirable proceeding. It is certain that, had it not been for such lack of coöperation, conditions of infestation in some districts would be much better than they are or are likely to be.

Preliminary inspections on the "heights" and valleys back of Honolulu, all of which include the most northerly precincts in the quarantined districts, appear to show that the infestation of wild guava is by no means as great as might have been expected, in view of the conditions which existed in the residential area before the clean culture campaign started. I hope to be able to report to you further as to this as soon as the mango season is over. The full force of inspectors will be required during the next month or two to see that all fallen mangoes are daily cleaned up and thoroughly destroyed. In many cases this labor will be forced on the department, as many of the poorer householders are

without yardmen and have no means of paying for any extra labor arbitrarily thrust on them.

Insular Conditions. In my last report I referred to the condition which had made itself manifest in North Kohala, Island of Hawaii. In consequence of this, I was requested to visit the districts on Hawaii and there organize committees of control, the idea being that each district would handle its own peculiar conditions. The results of my visit and that of Mr. Ehrhorn, the superintendent of entomology, have already been submitted to you by a special report. Since my return from Hawaii your board has adopted a new regulation (Rule XIV), having particular reference to any fruitfly conditions on the island of Hawaii. I am pleased to report that the Governor approved of this regulation the day it was transmitted to him and copies thereof have already been sent by me to the chairman of the committee in each of the districts of Hawaii. The regulation in question will be printed in due course.

In my last report I referred to a questionable case under observation in the laboratory, from Kona, Hawaii. I am now much pleased to say that the breeding of the fruit under suspicion produced melon fly (*Dacus cucurbitas*) and not the Mediterranean fruitfly (*Ceratitis capitata*). We still have other fruits under observation from Hawaii, which may have to be reported on later.

I would also report that the attorney general is at present formulating another regulation suitable to present conditions on Maui and Lanai, where the fruitfly, as yet, has not been found. This rule will give power to local authorities on the above named islands to prevent the introduction of any Hawaiian fruit (excepting bananas and pines) at the landings. Just as soon as this regulation has been drawn it will be submitted to your board for consideration.

General Remarks. In view of the fact that Rule X has not been found to exactly fit conditions as regards fallen fruit, your director has requested the attorney general to formulate an amendment whereby it will be compulsory on the householder to clean up and destroy fallen mangoes and other fruit daily. This amendment will shortly be submitted to your board for adoption or for such other action as may be deemed necessary.

Since my last report the following Honolulu fruits have been found by us to be infected with the Mediterranean fruitfly and should be added to the long list of those already reported on, viz.: Kumquat (*Citrus japonica*), *Murraya exotica* (small red fruit locally known as mock orange), *Eugenia* (species).

I would further report that coffee berries, varieties of orange, loquats, varieties of eugenia, and kamani seeds (species) appear to be among the worst infected fruits so far examined. It is not to be inferred from this, however, that other fruits are not also more or less attacked. Peaches are again coming into season and these will have to be specially watched, as that variety of

fruit is one which always receives the early attention of the fly.

Application has been made by your director to the superintendent of education to have its teachers educate the younger scholars in the public schools as to "clean culture" methods in the fruit garden. This is intended more particularly to secure the assistance of the youngsters in keeping the grounds of their parents free of fallen fruit and the proper disposal of same. The habits of certain classes of school children as to gathering ripe mangoes from trees and throwing the refuse on the sidewalk or thoroughfare, or in undue handling of infested but otherwise fair-looking fruit waiting for the garbage collector, is well known to many of us. It is quite possible that the teacher and scholar can coöperate with and assist this department on the lines suggested.

The superintendent of entomology has now in preparation a circular on the Mediterranean fruitfly, which, as soon as published, will be distributed to householders and to the board of education. This circular will no doubt be desirable as filling a much felt want.

Mr. H. A. Weinland, representing the California horticultural commission, has, among other duties assigned him by that body, continued to coöperate with the work of this department. Mr. Weinland has been paying special attention to the trapping of adult flies, as well as exploiting general conditions in and outside of the quarantined area.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.

DIVISION OF FORESTRY.

Honolulu, Feb. 29, 1912.

*Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.*

GENTLEMEN:—I have the honor to submit as follows the routine report of the division of forestry for February, 1912:

Forest Reserve Work.

On February 2, in company with Messrs. L. L. McCandless and H. M. von Holt, I visited the Government land of Kuokala, near Kaena Point, Oahu, to look into the question of fixing a

forest reserve boundary across its upper end. During March it is expected to have this line definitely laid out by a surveyor.

February 5 and 6, I was at Nanakuli with Mr. H. E. Newton of the Territorial government survey, marking out the forest line on the ground. Eight forest reserve monuments were erected at Nanakuli. The other points on the line were marked with small iron pipes.

During the month further progress has been made on several other forest reserve projects, which will be reported on in detail later.

At the board meeting held on February 12, I submitted reports on a plan for starting the reclamation of Kahoolawe and on a proposal from Mr. C. G. Owen to plant with forest trees a portion of the Pupukea forest reserve, Oahu.

Tree Planting Contract.

Mr. Owen's offer was to plant, mainly with eucalypts, an open tract of between 30 and 35 acres, a part of the area formerly known as "Water Reserve C," adjoining the section planted with trees under contract two years ago in return for the privilege of using the area for growing one crop and one ratoon crop of pineapples. The area is a narrow strip lying along the bluff overlooking the Kaleleiki gulch.

Ever since the Pupukea forest reserve was set apart it has been the intention of the board to plant up this area. Only lack of funds prevented its being included when the adjoining area was planted. By the present arrangement the planting is done without any cash outlay by the government, the trees, however, which are to be set out upon the removal of the ratoon crop getting the benefit of the cultivation given the pineapples.

The board having approved the general proposition, carefully worded specifications covering the planting were drawn up and embodied in a contract which was signed on February 23. The faithful performance of the contract is guaranteed by a bond deposited by Mr. Owen with the board.

Tantalus Forest.

On February 12, I published, as chief fire warden, a notice renewing for one year the period during which permits must be obtained before fires for burning brush may be started on Tantalus.

Later in the month an arrangement was effected with Mr. J. W. Caldwell, the new county road supervisor, in regard to completing the cutting of trees along the Tantalus road begun but soon after discontinued last year, under a previous administration. By having our Tantalus forest ranger exercise a general supervision over the Tantalus road cantoniers it is believed that a

good deal more can be accomplished than heretofore in putting the road into shape and keeping it so.

Experiments with New Rubber Trees.

Through the courtesy of Dr. A. Marques, the French consul, there was received in February a small consignment of the seed of *Ficus Schlechterii*, a tree from New Caledonia supposed to be of value as a rubber producer. Samples of this seed were sent to the managers of the several rubber companies and to the sub-nurseries of the board for trial.

From Puuwaawaa, Hawaii, Mr. J. F. Rock, consulting botanist, has recently sent in samples of the latex of a native Hawaiian tree, *Euphorbia lorifolia*, that appears to have possibilities as a rubber producer. The Hawaii agricultural experiment station is now making analyses of the latex of this tree. As yet there is nothing tangible to report. Mr. Rock writes that there are several thousand acres covered with this tree in North Kona.

Botanical Exploration.

Mr. Rock is now on Maui, having gone over from Kona on the last steamer. He reports having secured much interesting material from that district. Incidentally, he made an ascent of Mauna Loa from one of the dairy stations on the Greenwell ranch, establishing a new record as to time, in that he started at 4 a. m., reached the summit crater, Mokuaweoweo, and got back to a temporary camp in the edge of the forest the same night; from his account a somewhat strenuous excursion.

Mr. Rock is now collecting on the slopes of Mt. Haleakala. He expects to return to Honolulu about March 20.

Repairs to Office Building.

During the latter part of February the roofs of the main office building at the Government nursery and of the recent addition to the stables were painted with "Elastikote" paint. This ought to add considerably to their durability.

Report of the Forest Nurseryman.

As usual there is transmitted herewith the report of the forest nurseryman, covering the work of the month that comes under his direct charge.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of February:

Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot-grown. | Total. |
|--------------|-------------------|---------------------------|-------------|-------------|
| Sold | 400 | 1,520 | 1,975 | 3,895 |
| Gratis | ... | 1,500 | 474 | 1,974 |
| | <hr/> 400 | <hr/> 3,020 | <hr/> 2,449 | <hr/> 5,869 |

Collections on account of plants sold amounted to \$45.65.

Plantation Companies and Other Corporations.

No new orders have been received during the month. Tree planting on most of the plantations is practically finished for the season owing to the dry weather coming on and the labor being required for other work. The number of trees distributed under this head during February amounted to 26,200 seedlings. The roof of the potting shed has been extended to cover the soil and sand bins, and a new bench has been made for the workshop and toolshed.

Experiment Garden, Makiki.

The men at this station have been doing routine work, such as potting plants, transplanting and doing other work in connection with replenishing the stock, which was nearly exhausted owing to the numerous demands that we have been receiving during the past few months.

U. S. Experimental Planting, Nuuanu Valley.

The two men are kept busy hoeing and keeping down the grass. During the month of March we expect to plant more trees which are now ready at Makiki.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman

DIVISION OF ANIMAL INDUSTRY.

Honolulu, February 29, 1912.

To the Board of Commissioners, and Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the division of animal industry for the month of February, 1912, as follows:

Animal Quarantine Station.

Pursuant to the instructions from the Board, I have engaged Mr. Albert Davenport, until recently farrier in the 5th U. S. Cavalry, to take charge of the animal quarantine station. Mr. Davenport reported for duty on March 1, and is now in full charge of the station. His compensation is to be \$45 per month, quarters, light, fuel, and feed for one horse.

The construction of the kennels has been considerably delayed on account of inclement and rainy weather, which has practically made it impossible for the concrete work to be finished in time for the carpenters to do the construction of the fences. Provision has been made for the quarantine of twelve dogs in separate kennels, as follows: Four kennels for lap dogs; five for medium sized dogs up to pointers; and three for large dogs as Great Danes, etc. Care has been taken to have the entire construction made as sanitary and modern as possible with the means allowed and even then it has been found that the \$600 allowed for the purpose will barely suffice for the finishing of the kennels, leaving nothing for the provision of quarters for the keeper. It is estimated that an additional \$250 will be required for the extension of the present office so as to provide sleeping room and kitchen and to install the necessary conveniences such as washstand, shower bath and toilet, as well as a cook stove and utensils for the preparation of food for the quarantined animals.

Tuberculin Test of Dairy Cattle in the City and County of Honolulu.

The assistant Territorial veterinarian, together with the milk inspector, detailed by the city and county physician for this purpose, has practically finished the test of all the dairy cattle in the city proper, and will begin testing the cattle belonging to the railroad ranches at the commencement of next week. The test has proved very satisfactory, the percentage of reactors remaining below 5% as compared with 11% at the former test and 27% on the first test. The present percentage will, however, be perceptibly lowered, as it is safe to conclude that but a very small percentage of reactors will be found among the range cattle and the dairy cattle in the outlying districts, which are kept in a stable

only for a short period of each day, or else never come into a stable.

Of the 1600 head of dairy cattle tested in the city, less than 90 have given reaction, and it is a pleasure to state that with very few exceptions the owners of reacting animals have been ready to sacrifice them without question. The further fact that up to this date not a single animal among the reactors has been condemned on post mortem examination as unfit for food, demonstrates the fact that all of the bad cases of tuberculosis have been wiped out during the first two tests and those which are now reacting have been but recently infected, and in most cases as a result of the owners retaining reactors from the former tests on their premises, and thereby continuing the infection in their stables and yards.

Importation of Livestock.

The usual number of steamers have arrived during the past month, and, as will be seen from the report of the assistant Territorial veterinarian, a large number of horses and mules have arrived here, the greater number, however, coming from Seattle, and only two shipments requiring quarantine as coming from or through California. No dogs have arrived so far, but sufficient quarters have been finished to accommodate them should any arrive from this time on.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT FOR FEBRUARY.

Honolulu, February 29, 1912.

Dr. Victor A. Norgaard, Chief of the Division of Animal Industry, Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith a report of the work accomplished during the month of February.

Tuberculosis Control.

The work of testing the dairy herds is progressing rapidly and is meeting with no opposition on the part of owners. Less difficulty is experienced this year in getting owners to dispose of their reacting animals immediately. In fact, they now appear anxious to get rid at once of any source of infection and to have and maintain herds free from tuberculosis. It has taken time, and the experience of heavy loss on the part of some, from one or two reactors being kept in the herd, to bring about this much desired

spirit. Such coöperation on the part of owners makes the task of fighting this disease to a finish much easier.

The following is a list of the different dairies tested up to the present time, giving the total numbers of cows tested; the number passed, and the number condemned:

| | T. | P. | C. | Remarks |
|-------------------------|-----|-----|----|---------|
| Wm. Gomes | 10 | 9 | 1 | |
| J. H. Cummings..... | 5 | 5 | 0 | |
| D. P. R. Isenberg..... | 337 | 312 | 25 | 1 bull |
| Marshall & Azevedo..... | 28 | 26 | 2 | |
| P. M. Pond | 37 | 36 | 1 | |
| M. Gomes | 28 | 28 | 0 | |
| H. B. Brown..... | 13 | 13 | 0 | |
| S. J. Grace..... | 5 | 5 | 0 | |
| Capt. Hartman | 3 | 3 | 0 | |
| J. E. Faria..... | 20 | 20 | 0 | |
| R. Compos | 12 | 12 | 0 | |
| Frank Gouveira | 24 | 24 | 0 | |
| J. Quintal | 2 | 2 | 0 | |
| J. M. Whitney..... | 10 | 9 | 1 | |
| T. F. Farm..... | 45 | 42 | 3 | |
| Omai Tatsuchi | 10 | 10 | 0 | |
| F. C. Krauss..... | 1 | 1 | 0 | |
| K. Inouye | 8 | 8 | 0 | |
| W. P. Alexander..... | 5 | 5 | 0 | |
| I. Nagaki | 15 | 15 | 0 | |
| J. H. Cummings..... | 4 | 4 | 0 | |
| Mrs. C. M. White..... | 10 | 9 | 1 | |
| Frank Medeiros | 12 | 12 | 0 | |
| P. Miyakawa | 13 | 13 | 0 | |
| J. Allencastro | 7 | 7 | 0 | |
| K. Yamashita | 7 | 6 | 1 | |
| S. Hirata | 14 | 14 | 0 | |
| C. K. Quinn..... | 6 | 6 | 0 | |
| Chas. Frazier | 1 | 1 | 0 | |
| College of Hawaii..... | 15 | 13 | 2 | |
| H. E. Cooper..... | 15 | 15 | 0 | |
| Frank Andrade | 81 | 80 | 1 | |
| Kawaiahaō Seminary | 15 | 15 | 0 | |
| Mrs. Mary Quintal..... | 8 | 8 | 0 | |
| S. Tamoto | 9 | 9 | 0 | |
| M. Kawamura | 6 | 6 | 0 | |
| Mrs. W. W. Hall..... | 1 | 1 | 0 | |
| G. L. P. Robinson..... | 5 | 5 | 0 | |
| Frank Valph | 6 | 6 | 0 | |
| Chas. Bellini | 138 | 112 | 26 | |
| S. de Nobrega..... | 13 | 13 | 0 | |

| | | | | |
|---------------------------|-------|-------|----|---------|
| Oahu College | 12 | 12 | 0 | |
| Manuel Abreu | 3 | 3 | 0 | |
| John Rezants | 13 | 13 | 0 | |
| C. J. Day..... | 5 | 5 | 0 | |
| Geo. Wond | 18 | 18 | 0 | |
| Antone Pires | 8 | 8 | 0 | |
| Geo. Holt | 37 | 35 | 2 | 1 bull |
| Kamehameha Schools | 44 | 42 | 2 | |
| W. E. Miles..... | 17 | 16 | 1 | |
| Frank Correa | 13 | 12 | 1 | |
| Mrs. Mary Riedell..... | 10 | 9 | 1 | |
| Victorino Souza | 35 | 33 | 2 | |
| Alexander Young Dairy.. | 46 | 46 | 0 | |
| Desidero Tello | 2 | 2 | 0 | |
| John P. Mendonca..... | 10 | 10 | 0 | |
| L. C. Fernandez..... | 8 | 8 | 0 | |
| J. G. Silva..... | 4 | 4 | 0 | |
| A. Wilder | 2 | 1 | 1 | |
| Richard Kapena | 2 | 1 | 1 | |
| A. Tavash | 3 | 3 | 0 | |
| Mrs. E. Johnson..... | 2 | 2 | 0 | |
| S. M. Damon..... | 148 | 143 | 5 | |
| Galt & Carter | 13 | 13 | 0 | |
| M. Ota | 1 | 1 | 0 | |
| Chas. Bellina | 28 | 28 | 0 | |
| Chas. Lucas | 90 | 80 | 10 | 2 bulls |
| Total | 1,578 | 1,488 | 90 | 4 bulls |
| In 1911 S. M. Damon ranch | 185 | 181 | 4 | |

The following is a list of the importations of livestock at Honolulu since the date of the last meeting, February 9, 1912:

S. S. Lurline, Feb. 14, 7 crates poultry; S. S. Mexican, Feb. 16, 48 mules, Q. M. Dept., 3 horses; S. S. Sierra, Feb. 19, 3 crates Japanese games; S. S. Korea, Feb. 26, 3 dogs; S. S. Honolulu, Feb. 28, 2 bulls (shorthorn), S. M. Damon, 1 bull (shorthorn), 1 dog, 7 crates hogs, 2 crates poultry; S. S. Hyades, Feb. 28, 43 mules, Schuman Car. Co., 11 horses, E. E. Paxton.

Respectfully submitted,

L. N. CASE,

Asst. Territorial Veterinarian.

QUARANTINE KENNELS.

Itemized Statement of Expenditures to date in construction of kennels at Quarantine Station, Honolulu.

Concrete work, contract price 27c per square foot, 560 square feet in 13 separate squares (O. Oss).....\$151.20

| | |
|---|----------|
| Wire fence, 60 in. high at 250 ft. at 40c (Axtell)..... | 100.00 |
| Wire fence, 42 in. high at 270 ft. at 38c (Axtell)..... | 110.60 |
| Wire fence, 36 in. high at 150 ft. at 25c (Axtell)..... | 37.50 |
| Lumber, staples, hinges, nails (Allen & Robinson)..... | 126.37 |
| Sewer pipe, strainer, lead pipe (Hon. Iron Wks.)..... | 11.00 |
| Labor, supervision to March 9, incl. (O. Oss)..... | 122.00 |
| | <hr/> |
| | \$658.67 |

With an additional bill for labor, not exceeding \$40, the kennels proper will be finished, all the required material being on hand.

In regard to the keeper's quarters, the contract estimates that the same can be made habitable for approximately \$200 to \$250. As the room which is now used as office and laboratory must be continued as such and at the same time be made into a living room for the keeper, it will be necessary to build an addition or lean-to in which he can prepare his meals, sleep and dress. A kitchen sink will act as wash basin also and a shower bath and water closet at a slight distance can be constructed cheaply.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, February 29, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the division of entomology for the month of February as follows:

During this month we boarded 40 vessels and found vegetable matter on 24 of them. Careful inspection of all shipments was made with the following result:

| <i>Disposal with principal causes:</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 771 | 21,622 |
| Fumigated | 14 | 410 |
| Burned | 16 | 38 |
| | <hr/> | <hr/> |
| Total inspected | 801 | 22,070 |

Rice Shipments.

Twenty-five thousand four hundred and twenty-four bags of

rice arrived during the month, and being found free from insect pests was permitted to enter the Territory.

Pests Intercepted.

Thirty-eight parcels of fruit and vegetables were taken from immigrants at the U. S. immigrant station, and several lots of plants were destroyed on account of blights and scale-insect infestations.

Beneficial Insects.

One lot of Japanese beetle fungus was sent to Wailuku, Maui.

Hilo Inspection.

Brother M. Newell reports the arrival of five vessels at the port, finding three carrying vegetable matter, consisting of 83 lots and 1606 parcels, all passed as free from pests.

Inter-Island Inspection.

During the month of February 60 steamers were attended to, and the following shipments were passed on: 158 bags taro, 53 cases plants, 14 bags taro tops, 2 cases sugar cane, 1 case cabbage. Total, 228 packages.

The following packages were refused shipment: 24 packages fruits, 11 packages vegetables, 3 lots of plants, 1 box of sugar cane. Total, 39 packages.

At the suggestion of the director of fruitfly control, the president of the board of agriculture and forestry requested me to visit the Kohala district, where the fruitfly has made its appearance. I left Honolulu on February 13, remaining in the Kohala district until February 16, on which day I took a return passage for Honolulu. I have handed the director of the fruitfly control a report on the findings of my visit there.

Respectfully submitted,

EDW. M. EHRHORN,

Superintendent of Entomology.

A copy of the Sugar Industrial World, "devoted to the research of sugar industry and tropical agriculture," as a note to the Forster says, has been received. It is published in Tokio and in itself the periodical is an evidence of the agricultural progress of Japan at home and in her colonies.

STREET TREE PLANTING.

A paper read before The Outdoor Circle, Kilohana Art League, by Ralph S. Hosmer, Superintendent of Forestry, January 30, 1912.

Of the means of civic beautification that lie within the reach

of every community there is nothing that so adds distinction to a town or city as well grown trees along its streets. Whether planted for shade or for ornament, tree lined streets give an air of character and individuality that can be secured in no other way, and not only does street tree planting satisfy merely esthetic ends. It is, if properly done, translatable directly into terms of cash value, for it needs no argument to convince even the most thorough going materialist that a home surrounded by trees and approached through tree lined streets, will, other things being equal, fetch a higher price than a house standing alone in the open.

The following paper deals with certain of the principles that underlie street tree planting and their application. In general these principles are simple and for the most part the reason for applying them is self evident. The planting and proper care of trees are not in themselves difficult tasks. Good common sense and perseverance are the most needed requirements. But it is essential that the several steps in the program be systematically and faithfully carried out if real success is to be attained.

The planting of street trees differs essentially in its purpose from other forms of tree planting. In forest planting, for example, the object is the production of wood or timber or the protection of a water shed. In orcharding, to make the grove yield the most and the best fruit, while along the street the object of the planting is to add to the attractiveness of the street by securing shade or by adorning it with trees beautiful in color or in form.

To be adapted for street planting a tree must have a fairly erect habit, or at least be amenable to being brought into shape through pruning. It must be hardy enough to stand more or less neglect, and it should be of a species that is not continually dropping its leaves, twigs or fruit. Further, and especially here in Honolulu, where within an incredibly short distance natural conditions are decidedly unlike, it is essential that the tree be adapted to the soil and local climate of the immediate locality where it is to be planted.

But before coming to the choice of species there are other considerations that have first to be taken into account. Street tree planting is essentially a matter of coöperation. The first step is to work out a general plan, which, when adopted, shall have behind it interest and support sufficient to see it through. It is obvious that on certain streets trees would be out of place; that on others the requirements are already met by vegetation now growing along the way, within private grounds. Other things being equal street tree planting should begin on residential streets, and, again obviously, it is better to do a little well than to attempt so elaborate a program that the whole thing falls of its own weight.

Practically all the authorities are agreed that in street tree planting the best results both as to effect and as to management are

to be had by using a single species within a given unit of street length. Usually, this unit should include several blocks, both sides of the street. Here again is emphasized the necessity for coöperation.

Because of the many details that have to be attended to in tree planting, many of them requiring some technical skill to carry out, far better results will be got if the work is entrusted to some one body, such as a committee of the local improvement association, rather than if it is left to individuals. In Honolulu we are prone to over-organization. In this matter there is already in existence plenty of machinery. The proper organization to do the active work of street tree planting is the improvement club, backed by the Central Improvement Association, when questions arise that involve territory covered by more than one local club. What is needed now is to bring pressure to bear on the local clubs to have them take up and carry through this class of work. How such influence can best be exerted we need not here discuss, though personally I think that much more would be accomplished by the local improvement clubs, not only in this but in other ways as well, if there were more women members.

Having decided that a given section of a certain street should be planted with trees, the next step is to determine the location of trees, whether in the "parking" between curb and side walk, or within the boundaries of the lots. Much depends on the width of the street, and into the consideration comes, too, the question of where there is likely to be the least interference with the poles and wires of electric companies. We must, of course, recognize that until that happy day comes when all the wires go underground, it is only just that the electric companies have the right to keep their lines clear. But there is a great difference in the way the necessary pruning is done. Some of the foremen exercise care as it is now. Others, unfortunately, do not do so. Under the law the superintendent of public works has the power and authority to grant the right to set poles and to plant trees on the streets, and to make regulations governing the same. The question of how this control can be more strictly enforced is now receiving the attention of the Territorial authorities. But so far as possible it would be well to avoid friction by choosing for street planting those species which will keep below the wires, or by so placing the trees that they will not interfere with them.

Mention has already been made of the desirability in street planting of using trees of upright habit. It is extremely annoying to have low hanging branches extend over the sidewalk, and it is unnecessary, for only those trees should be used that will naturally, or that can be made to assume a proper shape.

Incidentally it may be said that in general the pruning of trees, while not a difficult matter, is one that should receive a larger share of personal attention from the householder than it now does. Every kind of tree has its individual habit. The object of prun-

ing is to assist nature by cutting out interfering branches and encouraging symmetrical development. If a clean cut is made as close as possible to the limb from which the branch is severed, if the work is carefully done so as not to tear down the bark, and finally if the wound is coated with a dressing to keep out fungi and insects,—and for this, ordinary green stain, carbolineum, is as good as anything—a great gain will be made over the senseless "topping" that now goes on in many local grounds regardless of age or kind of tree. In this connection attention may be called to the fact that the staff of the Territorial Division of Forestry, with headquarters at the government nursery, is always glad to give advice as to pruning and other tree work, either there or on the ground, as may best meet the needs of the applicant.

Of the kinds of trees that have successfully been used for street planting in Honolulu, the following deserve special mention: For ornamental effect: Golden Shower, Pink and White Shower, Royal Poinciana, Pepper and Rosewood or Jacaranda. For shade: Monkey pod, Siris tree, Silk Oak, Ironwood and several species of Eucalyptus. Some of the Palms are highly effective but because of their slow growth and need of attention are not so well adapted for street use as for private grounds. This list by no means exhausts the trees that have been and can well be used for street planting in Honolulu. But it will serve for the purpose of this paper.

Seedlings of suitable size for planting of most of the kinds named, except Palms, are kept constantly on hand at the government nursery and are furnished free for street planting. Upon due notice other species will be got ready if it is so desired.

In the planting out of trees the members of the Division of Forestry will be glad to give advice as to details. These are matters that need not be gone into now beyond the general observation that obviously those trees will grow best that receive the most care and attention at the start in the way of preparation of the soil, watering and subsequent protection.

Indeed it is the care given street trees subsequent to planting that determines largely if the result be marked by success or failure. It is easy enough to get people worked up with enthusiasm for an Arbor Day, but it is quite another matter to be sure that there will be some one on the job six months later to see that proper care is being given to the little trees until they become established, and later still to prune them properly, to place and replace stakes, and to give them water in dry times. Because all this is necessary is the reason why street tree planting can be done better by a permanent organization than by an individual or a temporarily appointed committee.

Some few years ago Honolulu was swept by a wave of interest in Civic Improvement which resulted among other things in the setting out of trees on several residential streets in the Makiki district. The start was a good one, but it was not followed up, and

today, in consequence, the streets planted stand more as a reproach and reminder of things left undone, than as they might well have been, avenues of brilliant color that would have been one of the features of the city. It is with no spirit of blame for any individual that this criticism is made, but rather with the hope that the experience so gained may be an incentive to more systematic efforts in the future.

Returning to a matter of detail in street tree planting, one of the most important points to be observed is the proper protection of the little tree by suitable guards. Especially is this true here in Honolulu where small sized seedlings are so generally used, and where on many of our streets it is not uncommon for the street trees to be exposed to cows on their way to and from their pastures.

Taken by and large there is certainly a great opportunity for street tree planting in Honolulu. There is enthusiasm among those who, if they will go about it right, can accomplish wonders. The machinery is already at hand in the local improvement clubs, in the Central Improvement Association and in the special committees of other organizations that can help by bringing the matter to a head in any one locality. There is expert advice to be had for the asking on all technical points and there are free trees waiting to be called for. Everybody is ready for the individual or group of citizens who can start the ball rolling and keep it under way. The result of their labors will be to make Honolulu a pleasanter place to live in, a better as well as a more beautiful city.

REVIEW OF CURRENT LITERATURE.

VAUGHAN MACCAUGHEY.

Principles of Rural Economics, by Dr. Thomas Nixon Carver, Professor of Political Economy in Harvard University. Ginn & Co., Boston. 1911. 386 pp. 5½x8 ins.

This is an authoritative and well-written text. It consists of six large chapters—General Principles; Historical Sketch of Modern Agriculture; The Factors of Agricultural Development; Management in Agricultural Production; The Distribution of the Agricultural Income, and Problems of Rural Social Life. There is no specific mention of Hawaii in this book, but the point-of-view and concise style of the author should engage the attention of any one seriously interested in the welfare of Hawaii's agricultural enterprises. The sketch of modern agriculture is particularly illuminating in its exemplification of the significant economic interpretation of history. The work is true to its title, in that it elucidates the fundamental principles of the subject. The mate-

rial is well classified and ably presented. The book contains an excellent bibliography.

Fundamentals of Agriculture, edited by James Edward Halligan, Chemist in charge, Louisiana State Experiment Station. D. C. Heath & Co., Boston. 1911. 492 pp. $5\frac{3}{4} \times 8\frac{1}{4}$ ins.

A well illustrated text-book on general agriculture, of the type now largely used by secondary schools offering agricultural instruction. There is a brief introduction by Pres. Butterfield, of Mass. The chapters are: The Soil; Plant Life; Manures and Fertilizing Materials; Farm Crops; Trees and the Garden; Plant Diseases; Insects and Birds; Live Stock and Dairying; Feeds and Feeding; Miscellaneous. A unique feature is that "every subject in this book is written by an expert in his line. This idea was carried out in order to furnish the student with the best information that could be obtained." The section on sugar cane, for example, is written by Prof. H. P. Agee, then of the Louisiana Sugar Experiment Station, now of the H. S. P. A. Station. The book is distinctly southern in its point-of-view, and is thus of interest to Hawaii. The accounts of cotton, rice, sugar cane and tobacco, are explicit and well written. Each chapter contains a good set of references for collateral reading. The illustrations are of good quality throughout. The appendix contains a number of useful tables, and suggestions for an agricultural school library. Teachers in Hawaii's rural schools could make good use of this book.

Cultivation of Tobacco in the Philippine Islands, by B. E. Brewer. Philippine Bureau of Agriculture, Farmers' Bulletin 16. 1910. Pp. 23, plates 3, figs. 3.

This is a brief handbook of information for the tobacco grower in the Philippines.

Sisal Hemp in Fiji, by C. H. Knowles. Dept. of Agric. of Fiji. Bul. 1, 1911. Pp. 16, plates 2.

Directions for growing and harvesting sisal, and for extracting the fiber; with statement of results obtained at the experiment station.

Australian Timber: Its Strength, Durability and Identification, by J. Mann. Melbourne. 1909. Pp. xvi-148, figs. 19.

A compilation of data available prior to 1900, relative to the strength and durability of about fifty of the best known engineering and construction timbers of Australia.

The Orange Thrips, by T. R. Jones and J. R. Horton. U. S. Dept. Agric. Bur. Entomol. Bul. 99, part 1, pp. 16, plates 3, figs. 2.

A report of progress for the years 1909, 1910. An important

paper, dealing with an important group of citrus pests. The orange thrips were found, not only on citrus, but also on pomegranates, grape, California pepper tree, dock, pursland, and a wide variety of other plants.

The Unification of Reducing Sugar Methods, (A Correction), by Percy H. Walker, Chief, Contracts Laboratory, U. S. Dept. Agric. Bur. of Chemistry, Circular 82, pp. 6.

Grape Propagation, Pruning, and Training, by George C. Husmann, pomologist in charge of viticultural investigations, U. S. Dept. Agric. Farmers' Bulletin 471, pp. 29, figs. 30.

The Avocado in Hawaii, by J. E. Higgins, C. J. Hunn and V. S. Holt. Hawaii Agric. Expt. Station, Bul. 25, 48 pp., 7 plates, 13 figs. 1911.

This excellent bulletin is heartily welcomed by all in Hawaii who are interested in local horticultural problems. It fills a long-waiting gap in the scant literature of tropical fruit production. The text is well classified and fully illustrated. The main sections are: botany and history of the avocado; natural and cultural requirements; control of insects and diseases; the crop and its marketing; breeding the avocado; the avocado as food; varieties. The sections of particular fullness and interest are those dealing with propagation, marketing, methods of serving, and descriptions of varieties. The blank or form for describing varieties is unusually complete. Of the many Hawaiian varieties, about sixty-five have been described by Mr. C. J. Hunn. Experiments with sprays are now in progress, to control scale (*Pseudococcus*), green caterpillar (*Amorbia*), and fungus (*Gloeosporium*).

The following extract from the introduction illustrates the present market situation, " * * * the growing of this fruit is only an infant industry. For a long time it was impossible to develop it because of the lack of a ready means of rapidly multiplying a good variety and thus establishing the uniformity in product which is necessary in all market fruits. This difficulty has now been removed and development is in progress. There are probably more than 100 acres now planted in orchard in Florida, and inquiries are coming to Hawaii from California for thousands of seeds to start nurseries."

(To be Continued)

RECENT INVESTIGATIONS IN INSECT PARASITISM.

BY OTTO H. SWEZEY

(A paper read before the Agricultural Seminar, College of Hawaii,
February 15, 1912.)

(Concluded)

In the work of introducing parasites from foreign countries, care has always been taken lest hyperparasites be introduced along with them, and thus, if they also became established, lessen the effectiveness of the parasite. It has sometimes been supposed that a parasite thus taken to another country without being accompanied by its native hyperparasites, would be more effective when successfully established in a new place than it was in its native place. The above experience has tended to modify the stand taken on the question of hyperparasites, and it is seen that the benefits to be derived from the exclusion of hyperparasites are not so great as has always been supposed, and the danger from their introduction is much lessened—that is, in cases where there are native hyperparasites which are counterparts of the foreign ones.

With the Tachinid flies that have been introduced, there has been better success. These parasitize the gipsy-moth caterpillars. Nine species have been colonized, some from Europe and some from Japan. Most of these were satisfactorily colonized, and at least two species seem to have become established, while there are good hopes for some of the others.

In the work with the Tachinids, a great deal of new information was gained as to the habits of the different species of this family of parasites. The ordinary method of oviposition for Tachinids has been known for a long time. The adult female deposits her eggs on the surface of the caterpillars; they hatch and the young maggots penetrate the body of the caterpillar to feed upon the fat-bodies, juices, and eventually the vital organs; then, when full-grown, they emerge to pass through the pupal stage in the ground. Among the species studied at the Gipsy Moth Parasite Laboratory, were some that were found to have different habits from that, so a careful study was made of the habits of all of them in so far as possible. Sasaki, a Japanese entomologist, had, about twenty years previously, in studying the parasites of the silkworm, ascertained that a Tachinid deposited its eggs on the leaves. When eaten by a caterpillar feeding on these leaves, they hatched inside the alimentary canal, bored through its walls, and located for a time in ganglia. Later on, they became fixed with the posterior end in close connection with spiracles and feeding on the juices and fat of the caterpillar, eventually killed it.

Among the species studied at the laboratory, this method of oviposition was found, as well as several others. One species was found to deposit living maggots on the surface, another beneath the skin of the host caterpillar; and one deposited living maggots on leaves where they awaited a convenient opportunity to attach themselves to a caterpillar and penetrate its body. There are now known to be these five methods by which young Tachinids gain access to their host caterpillars: host-oviposition; leaf-oviposition; supra-cutaneous host-larviposition; subcutaneous host-larviposition; and leaf-larviposition.

Another matter of great interest was brought out in these investigations—that is, that many Tachinids are physiologically restricted in their host relationships. For instance, if larvae of any Tachinid gained access to a caterpillar in any of the above mentioned ways, conditions might be found such that they might fail to develop, if the conditions, chemically or physiologically, were different from those in their own special host. It is for such reasons probably that many parasites have come to have such intimate correlation with certain hosts that they cannot survive or thrive satisfactorily on any other host. Hence, in the consideration of the introduction of parasites, the most valuable ones would be those that were restricted or closely correlated with the particular host that they are desired for, other circumstances being favorable.

Several Hymenopterous parasites of gipsy-moth pupae have been introduced. One of them (*Monodontomerus*) has become established, and very widely spread throughout the region infested by the Gipsy Moth. Investigations show that it has spread at the rate of ten miles per year. After colonization of this species had begun, it was pronounced a hyperparasite by Dr. Ashmead; colonization was then stopped, even though they were emerging in large numbers from imported parasite material under conditions which pointed toward it being an important primary parasite. Later investigations showed that it was chiefly a primary parasite, even though it was also sometimes a secondary on Tachinids and others. Colonization was again resumed, with the result that it is now the most widely spread of all the parasites that have been introduced. In fact, it has been found spread nearly throughout the infested region. It attacks Brown-tail Moth pupae to a greater extent than it does Gipsy Moth pupae. It has also been found to attack pupae of native moths. As a hyperparasite, it has been bred from Tachinids and from the cocoons of the Braconid, *Apanteles*.

Many of the parasites that I have found so far mentioned, attack both the Gipsy Moth and the Brown-tail Moth. Besides these, other parasites have been investigated and their introduction attempted, which attack the Brown-tail Moth and not the Gipsy Moth. Some of these have been more successful than those on the Gipsy Moth.

It will be seen then that an attempt has been made to secure as many parasites as possible to attack each of the different stages of the moths; and to produce as nearly as possible the same kind of sequence of attack that prevails in the native habitat of these pests—that is, to establish as many as possible of the parasites attacking each of the different stages: egg, larva and pupa.

Summary of parasites introduced or colonized: Egg Parasites, 4 species; 2 species established. Parasites of caterpillar, 20 species; 7 established. Parasites of the pupae, 5 species; 1 established. A total of 29 species, 10 of which have become established.

It was confidently expected that several others would be found established when the time came for making the necessary investigations. Some of them were so recently colonized, that it is not expected that it can be determined yet whether established or not, though some additional ones may have been found established by the investigations in 1911, of which we have no report at hand.

The situation at present is considered satisfactory, but it is expected that five or six years time may yet be necessary before proof is reached as to whether these two pests can be controlled by the introduced natural enemies. In the meantime, plans are being made to continue the introduction of parasite material.

In the course of all this work, many observations of extreme biological significance have been made, particularly with regard to the interrelation of host, parasite and hyperparasite. Some of these have already been mentioned, as for instance the five different methods by which the different Tachinids attack their hosts.

Another interesting habit is in the case of one of the egg-parasites from Japan (*Schedius*). The egg of this parasite is supplied with a long stalk. It is placed within the body of the unhatched caterpillar within the egg of the host, but usually with the end of the long stalk projecting outside the host egg. "When the parasite egg hatches, it does not entirely leave its shell, but remains with its anal end thrust into it, and the stalk which is hollow, becomes functional and acts like a life-line attached to a submarine diver in supplying a connection with the outer air." As the larva grows through its two first stages it retains this connection with the life-line. This is one of the parasites which also act as hyperparasites; for example, if the host egg had already been parasitized and now contained the full-grown larva of that parasite, it would be the victim of this parasite, which in turn might be destroyed by yet another hyperparasite, according to the conditions in Japan where it came from.

A more particular hyperparasite is one, that, having gained access to the body of the host, wanders about in search of any parasites that might be there, apparently not injuring the host.

and not being able to survive unless it finds a parasite larva in which to live.

Another place where a study of the interrelation of parasite and host are being minutely studied is at the laboratory of the Agricultural School at Portici, Italy. Many new and interesting habits are being brought to light. Dr. Silvestri, at this place, has made some most minute investigations of polyembryony. Polyembryony is that method of development by which a large number of embryos is produced from one egg, as occurs with some of the Chalcididae. Dr. Silvestri investigated this phenomenon with *Litomstix*, a parasite of *Plusia*, and a number of other moths. According to his investigations, the process of development is as follows: the adult female parasite deposits one egg in an egg of the moth. It does not destroy the egg as egg-parasites do. It does not interfere with the embryonal development of the host nor the hatching of the caterpillar, nor does it prevent the latter growing to its full size; on the contrary, a parasitized caterpillar attains a somewhat larger growth than a normal healthy one. Returning to the egg of the parasite, a peculiar nuclear division takes place in its development, which results in a segmentation different from usual, by which, eventually, a large number of minute embryos is formed from this one egg. These embryos then feed and grow in the growing caterpillar, not killing it till after it has become full-grown and spun its cocoon; when they soon finish their growth, having eaten the entire contents of the caterpillar skin which they entirely fill, giving it the appearance of being crammed full and stretched beyond the normal size. These parasite larvae pupate in this position, and in due time the adults emerge to the number of several hundred, even thousands. As high as 3000 has been reported as produced in this way in one caterpillar, and all having originated from a single egg. This method of development is known for a number of parasites. We have in the Hawaiian Islands a parasite on native wasps which probably reproduces in this way, though the details of it have not been worked out for this species.

Some mention should be made of the investigation of parasites in connection with the cotton boll weevil in the Southern States. No parasites have been obtained from foreign countries, but in the study of the native parasites, 26 species have been found attacking the boll weevil. These sometimes have been found killing quite a good percentage of the weevils, and thus becoming one of the important factors in their control, in 1909, producing an average destruction of 16 per cent. A good deal of work has been carried on in distributing the more efficient of these parasites from one place to another in Texas, and also to those places in Louisiana and Mississippi to which the weevil has spread.

Considerable experimenting has also been done in the transfer



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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables, etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 5; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

MAY, 1912.

No. 5.

MANILA MOSQUITO CAMPAIGN.

The following appears in the report of the Philippine bureau of science for the past year. It shows that "everlastingly at it" is the price of success in war upon this great insect pest of man and beast:

"In the month of August, 1910, after a thorough canvass of the field, a plan was suggested to the Director of Health, whereby a temporary antimosquito brigade might be established looking toward the eradication of the brown mosquito, *Culex fatigans* Wied., in the city of Manila and incidentally the lessening of the day mosquito, *Stegomyia persistans* Banks.

"The work was not permanently organized until February, 1911, since which time we have been receiving the coöperation of the Bureau of Health and the Municipal Board of Manila. It is safe to state that the brown mosquito practically has been exterminated in Manila. It is now almost impossible to secure specimens of it for experimental purposes.

"It is believed that this is the most serious mosquito pest we have, but it can not be denied that, occasionally and for limited periods, other mosquitoes might breed, if conditions favorable to them were provided. This has been more than strikingly borne out recently by finding *Culex microannulatus* Thoebl., another vicious biter, breeding in artificial pits, ponds, and pools created in the process of construction going on at the new fill on the water front and other work of improvement and beautifying in the city of Manila. This mosquito, like the brown one, has distinct and peculiar habits and can be kept down if one branch of the government will coöperate with another in preventive measures.

"The work of eradication was somewhat crippled when the American sanitary inspector in charge of it went to the United States on leave. It can readily be understood that, unless this work is continuously and steadily pushed under the supervision

Forest Extension.

With the approval of the board a readjustment has been made, to take effect April 1, of the money allotted to the sub-nurseries maintained by this division at Hilo, Hawaii and Homestead, Kauai, whereby work at the former station is somewhat curtailed and that at Homestead correspondingly expanded. At the latter nursery the additional money will be used particularly for the planting out in the experimental garden at Papaholahola of a considerable number of plants newly introduced to the Territory, that have been propagated at our station in Makiki Valley.

Just at present the demand for trees at the Hilo nursery seems to be slack, though Bro. Matthias Newell reports that for the period from January 1 to March 23, 1912, 1530 trees were given out from that nursery. In addition to this, some 1500 Japanese cedar trees, in boxes, have been forwarded from Hilo, via Honolulu, to Kona, Hawaii, where with an additional lot from Honolulu they are to be planted out by the manager of one of the coffee companies.

Advice and Assistance.

A valuable point of the work of the division of forestry is the giving of advice to persons desiring information as to the growing and care of trees. Calls of this character take up not a little of the time of the forest nurseryman. During the past month, in addition to answering inquiries made at the office, Mr. Haughs has visited a number of places about the city and given practical suggestions to a committee from the Kilohana Art League now actively interested in street tree planting.

Mr. Haughs' report, transmitted herewith, gives details in regard to the plants distributed during the month.

Return of Mr. Rock.

On March 30, Mr. J. F. Rock, consulting botanist of this board, returned to Honolulu from a field trip of nearly three months to Hawaii and Maui. Having visited several localities of botanical interest not previously known to him, Mr. Rock brings back much new herbarium material, besides many notes and photographs that will be of great value in future work.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

Honolulu, March 31, 1912.

R. S. Hosmer, Esq., Supt. of Forestry, Honolulu.

Dear Sir: I herewith submit a report of the principal work done during the month of March.

Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|------------------|-------------------|---------------------------|---------------|--------------|
| Sold | 9,000 | 100 | 1,864 | 10,964 |
| Gratis | 5,000 | 800 | 123 | 5,923 |
| | <hr/> 14,000 | <hr/> 900 | <hr/> 1,987 | <hr/> 16,887 |

| | |
|--|------------|
| Collections on account of plants sold amounted to..... | \$20.30 |
| For eucalyptus trees from Tantalus..... | 5.00 |
| From division of animal industry for manure sold..... | \$4.00 |
| For use of animal quarantine station..... | 1.00 |
| | <hr/> 5.00 |

Total \$30.30

Plantation Companies and Other Corporations.

We have not received any orders for plants but we have delivered 4000 ironwood (*Casuarina equisetifolia*) in boxes transplanted during the month.

Experiment Garden, Makiki.

The men at this station have been busy transplanting seedlings, preparing soil and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The two men have been hoeing and clearing away grass from the trees, also assisting in the planting of more trees. One day was spent by all the men that could be spared from Makiki and the nursery in the planting of more trees.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

REPORT FOR APRIL.

Honolulu, May 3, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the division of forestry for the month of April, 1912:

During the first half of this month my own time was largely taken up with matters in connection with proposed forest reserves on the Waianae range, Oahu, and in the Kula district, Maui, and in the preparation of a brief report of the work of the division of forestry for the year 1911, for the use of the members of the board.

In this connection it may be of interest to note here the number of seedling trees given out from division of forestry nurseries during 1911. The list is as follows:

FROM THE GOVERNMENT NURSERY, HONOLULU.

Regular Division.

| | |
|-----------------------------|---------|
| In seed boxes..... | 195,250 |
| In transplanted boxes | 23,613 |
| Pot plants | 29,533 |

Special Plantation Orders.

| | |
|--|---------|
| In seed boxes | 338,000 |
| In transplant boxes..... | 11,000 |
| Total | 597,396 |
| From the Hilo Nursery..... | 12,104 |
| From the Homestead, Kauai Nursery..... | 11,239 |
| Grand total | 620,739 |

TRIP TO MAUI.

From April 23 to April 30 I was on the Island of Maui, engaged in making an inspection of forest planting in localities in which the Territory has a more or less distinct interest.

At Wailuku I arranged with Mr. H. B. Penhallow, manager of the Wailuku Sugar Company, details in regard to the planting of a portion of the government land of Polipoli, set apart last year as a part of the West Maui forest reserve. I also had a general look at the planting which the Wailuku Sugar Company has been carrying on on its private lands on the lower slopes of the hills above its cane fields, back of Wailuku. The notable thing here is the excellent start which both ironwood and eucalyptus seedlings, planted out over a year ago, are making on the bare, eroding slopes, especially on the south side of Iao Valley. Not only are the little trees doing well but small as they are, leaves and forest litter are already beginning to collect under them, helping to hold the soil in the little gullies and check the damage from wash. This is work of high value which cannot but repay the plantation company in years to come. In addition to the strictly protective belts, Mr. Penhallow is also doing considerable planting on algaroba and eucalyptus with the object of securing a fuel supply for the plantation. In all 11,400 trees were planted at Wailuku in 1911.

In the Koolau District.

Next I spent several days in the Koolau district carefully going over the forest planting work now in progress along the ditch systems controlled by the Alexander & Baldwin interests. This planting, for the most part on government land, is being done

jointly by the Hawaiian Commercial & Sugar Company and the Maui Agricultural Company, under a plan drawn up by me last autumn. The general purpose of the planting is to establish shelter belts to assist in the return of the native forest on areas where large numbers of trees died a few years since and to start stands of thrifty trees in places now without useful vegetation.

Under the general direction of Mr. W. F. Pogue, the work is in charge of Mr. W. E. Saffery. Since October last some 14,000 trees have been set out, principally eucalyptus, of species that have been shown by experience to do well in the wet and exposed locations where the planting has to be done.

It is encouraging to note that the native Hawaiian forest shows every indication of recovery. There has apparently been no setback since the trees started to grow again and undergrowth of certain desirable kinds is considerably more in evidence now than it was a year ago when I visited Koolau.

Plans for continuing the planting and for further assisting the return of the native vegetation were discussed in detail on the ground with the men in charge. Now that the work has been got well under way progress will be more rapid, but the record for the last six months is a decidedly satisfactory one.

Forest Planting at Kailili.

On my return from Kailua I stopped for a day with Mr. Waldemar Hannestad at Kailili, particularly to arrange with him about the planting of a portion of the Makawao forest reserve, a government land. This work is being done under an agreement made some two years ago with the Maui Agricultural Company whereby trees are being planted in return for the right to remove dead wood. On the fee simple lands of the Maui Agricultural Co. at Kailili, Mr. Hannestad has this winter planted out about 170,000 seedling trees. Unusually cold weather has retarded the growth of trees all over Maui but with the coming warm months the trees set out will grow rapidly. For several years now the Maui Agricultural Company has planted about 100 acres of forest a year at Kailili, principally *Eucalyptus globulus*, and *E. robusta*, and Japanese Cedar. For the most part the trees are set 5x5 feet, or 1750 to the acre, thus making a close stand. The purpose is to produce timber and wood. A fine forest is being produced.

Other Forest Planting Projects.

Of other tree planting projects in progress on government land I am glad to report that the planting of the Kohala mountain above Waimea village is going ahead well. Dry weather during the late fall and early winter delayed planting, but in the last two months many trees have been set out. Mr. A. W. Carter reports that but very few indeed of the trees planted last year died during the winter. Considering the adverse conditions of

soil and situation and the unfavorable weather, this is extremely encouraging. The area required to be planted is now practically completed, but the Parker Ranch is continuing the work by extending the block of planted forest over its own adjoining fee simple lands.

Under the tree planting contract with Mr. C. G. Owen, recently made for Pupukea, Oahu, the first installment of trees went out from the Government Nursery early in April. These are to be used as a windbreak on the edge of the gulch adjoining the area to be planted in pineapples and later with trees.

Under the provisions of government leases requiring such work, tree planting is going forward on government land at Kukaiau and Upper Paauhau, Hawaii, and at Kula, Maui. From all three of these places satisfactory reports have recently come in.

This year the demand from plantation companies for seedling trees has continued later into the spring than is usual. Several considerable orders were placed in April. The details are given in Mr. Haughs' report.

Experimental Work.

Thro' the courtesy of Hon. A. de Sousa Canavarro, Consul for Portugal, the division of forestry received some time ago cuttings of basket willow. These were propagated at the experimental garden in Makiki Valley, and in April enough shoots were cut to make a half dozen good-sized baskets and hampers. This work was done by a Portuguese laborer skilled in basketry. There are no cuttings ready for distribution as yet, but next year a considerable number of persons can be supplied. There seems no good reason why in time basket making in Hawaii should not become an industry employing a goodly number of persons. This project is past the experimental stage. It is simply a question of how fast the parent plants can be made to reproduce.

Official notification has just been received from the Federal forest service, Washington, that for the fiscal period from July 1, 1912, to June 30, 1913, the sum of \$500 has been allotted for continuing experimental tree planting in Hawaii. Allotments from the forest service have now been received for several years. At first all the money was spent in planting temperate zone conifers on the higher mountains. Many of the results here, as was to be expected, were negative, but on the showing made Mr. H. S. Graves, the Federal forester, says in a letter dated April 4, 1912: "The reports show that careful and thorough work has been done and that successful methods of reforestation adapted to the various sites where tests are in progress will undoubtedly be developed. I am much pleased with the showing made and the results which you have accomplished with the expenditure of forest service funds for developing reforestation methods adapted to Hawaii."

Last year a plantation of certain species of eucalyptus new to Hawaii, considered to be of economic value, was started in Nuuanu Valley with a part of the money.

Considering that the forest service appropriations were very materially cut this year by Congress, the fact that the allotment for Hawaii was continued is significant of the importance that is attached to this type of work by the forest service. For the coming period it is proposed to expend the forest service money in continuing the work on the high mountains and in extending the eucalyptus plantation in Nuuanu.

Forest Fire Notes.

On the afternoon of April 11, members of the division of forestry staff responded to a call for a grass fire on the slope of Punchbowl. On the evening of April 30, Mr. Haughs hastened to Kalihi Valley on a report of a forest fire there. Fortunately this report proved to be unfounded.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF THE FOREST NURSERYMAN.

The following report gives the principal work done during the month of April:

NURSERY.

Distribution of Plants.

| | In boxes transplanted. | Pot grown. | Total. |
|------------------|---------------------------|---------------|--------------|
| Sold | 900 | 2,773 | 3,673 |
| Gratis | 4,749 | 3,731 | 8,480 |
| | <hr/> 5,649 | <hr/> 6,504 | <hr/> 12,153 |

Collections.

| | |
|--|---------------|
| Collections on account of plants sold amounts to | \$18.80 |
| From division of animal industry for extra quarantine expenses | 3.00 |
| | <hr/> \$21.80 |

Plantation Companies and Other Corporations.

From the stock raised with labor supplied by plantation companies and other corporations we have received orders and supplied the following plants:

| In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|-------------------|---------------------------|---------------|--------|
| 7,000 | 3,550 | 3,103 | 13,653 |

Collecting of Seed.

The two seed collectors have been collecting seed, in and around the city, of a number of species of forest and other trees. The seeding season for most of the forest trees is just commencing.

Alarm of Fire in Kalihi Valley.

On the evening of April 30, a message was sent from the police station stating that they had received a telephone message from Kalihi Valley notifying them that a fire was raging in the brush. The writer, along with Manuel Freitas, the stable man, drove up to the top of the Valley road but there was no fire to be seen. We found out that some Japanese working on Mr. Francis Gay's place had been burning brush in the afternoon which was probably the cause of the alarm.

Experiment Garden, Makiki.

The work at the garden has been principally transplanting and potting trees. Two of the men employed for the purpose of raising trees for plantation companies and other corporations were discharged at the end of the month owing to the want of money in this fund to carry on the work. One man will continue to do this work during the month of May, at least, enough money being left to pay the wages of one man.

U. S. Experimental Planting, Nuuanu Valley.

At the end of March one man was discharged, leaving one to do the hoeing and care of the trees. More trees will be planted during the month of May.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, April 8, 1912.

Hon. Wm. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir: I have the honor to report on the work of the division of animal industry for the month of March as follows:

Bovine Tuberculosis Control Work: As will be seen from the appended itemized report of the assistant Territorial veterinarian more than 4000 head of dairy cattle have been tested, with the highly gratifying result that only 139 head reacted

to the test, that is, were found to be infected with tuberculosis. Without exception the owners of these infected animals have taken steps for their immediate segregation and ultimate disposal for slaughter, no reacting animal, so far as can be ascertained, being left on premises from which milk is produced. It seems now to have become a well established rule for all milk consumers here to look into the source and origin of the milk served at the table or used in the household, and to inquire diligently of the vendor or dealer: "Have your cows been tested, and are they free from tuberculosis?"

As every milk producer is well aware that his answer to these questions can be verified in a moment by calling up this office on the telephone, there is little to be gained by evading the truth, and the fact is that many inquiries are being received by the officers of this division in regard to the state of health of the dairy animals, as well as of the hygienic and sanitary conditions under which milk is being produced by various dairymen. In replying to such inquiries it has been made a rule not to discriminate or to draw lines as to whose milk is produced under the most satisfactory conditions, but if a dairyman neglects to clean up his herd by removal of reacting animals or if he fails to disinfect after such removal, or in other ways omits or forgets to provide improvements, when requested to do so, the facts will soon reach his customers, at least those who insist upon having clean milk from healthy animals.

The rule established by the Honolulu Dairymen's Association to refuse absolutely to receive or in any way handle the milk from dairies where reacting animals have been retained, or even where untested animals are kept, has had a salutary effect on the entire local dairy industry, and obverse or contrary reports notwithstanding, it must be admitted that the dairymen of the city and county of Honolulu have responded most admirably in their concerted effort to suppress this most destructive and dangerous of all scourges—animal as well as human. The report of this division for the month of September, 1910, when the first annual tuberculin test of the dairy herds of the city of Honolulu had just about been finished, shows 556 reactors out of 1715 animals tested, or 32.42 per cent. The present test of the same herds, those of the city alone, shows 1761 animals tested with 94 reactors or 5.34 per cent. This latter figure is, however, somewhat misleading as it is unproportionately influenced by the number of reactors in one herd, where little or no effort has been made to stamp out the disease, and where no less than 76 reactors were found among 138 animals. If this one herd is eliminated in calculating the results, we find that the percentage of reactors is only 4.77 for the city and 2.89 for the city and county. In regard to the number of dairies in which the disease was found, more

than 90 per cent were found to harbor the infection when first tested, while nearly 80 per cent were found to be clean by the present test. Besides this highly gratifying result, every owner of reacting cattle has either already sent the infected animals to be destroyed or has promised to do so at the earliest possible opportunity. Even the one herd with the twenty-six reactors was cleaned out the same day the result of the test was reported to the owner. It should be mentioned that every reacting animal is plainly branded, and as nearly every dairyman has had that same brand applied to one or more of his own animals during the past two years, it is not likely that there is anybody left who does not know the brand when he sees it, and is hereby protected against purchasing or admitting to his premises, or tolerating on adjoining premises a tuberculous animal.

The fact that tuberculosis among the local dairy herds has been immensely decreased is further demonstrated by the fact that out of the 139 reactors found by the last test only two or three showed physical symptoms of the disease. All of the rest of those which have been killed so far showed on post mortem examination but very slight lesions, so slight in fact that it is very doubtful whether the affected animals could possibly have transmitted the disease to other animals in their immediate neighborhood or surroundings. Two of the physically affected animals were family cows, which had never been tested before. Unfortunately there seems to be a definite conviction in the public mind that the family cow, or the cow from which no milk is sold, need not be tested. It can therefore not be too strongly emphasized that the untested family cow is an extremely dangerous animal to obtain your milk supply from, especially in view of the fact that the tuberculous cow often is a heavy milker and that even the advanced stages of tuberculosis does not change the appearance or taste of the milk.

Not until the disease has spread to the udder and is destroying the milk gland itself, does the appearance of the milk indicate the presence of the disease in that organ, while for weeks before that stage is reached the milk contains millions of virulent tubercle bacilli, even though retaining its normal appearance. When to this is added that the milk from the family cow generally is consumed undiluted or unmixed with the milk from other cows, it becomes imperative that this cow, of all, should be the first one to be tested, especially where children are fed the milk.

Section one of the local Milk Ordinance further states that: "No milk producer shall offer for sale or deliver for sale, **use** or **consumption**, any milk without first having obtained from the board of supervisors a permit to do so." That certainly makes it plain that a permit must be obtained whether the milk is sold or given away so long as it is consumed and as no per-

mit can be granted unless the cow has passed the tuberculin test, it would seem that some of the owners of family cows, who do not sell milk, are violating the milk ordinance, even though unwittingly.

The intradermal method of testing has been employed exclusively and has given absolute satisfaction not alone to the operator but, on account of its simplicity, to the dairy owners also. The fact that the owner can see for himself whether an animal reacts or not has made this form of testing very popular, and numerous post mortem examinations of reactors have convinced us that as a diagnostic agent, the method is just as reliable as the subcutaneous method, and vastly easier of application and interpretation.

The Quarantine Station: The installation of the kennels has been finished and the first occupants, a family of six Japanese spaniels, were received by the S. S. Manchuria on March 25.

As several outbreaks of rabies have occurred in San Francisco of late, it would seem that the quarantine of dogs on account of this disease was a well advised step. The measure has met with considerable criticism, most of which has been based on either ignorance or misinformation as to facts and has been easily refuted. The cost of feeding the family of six now at the station has averaged about 30 cents per day, but this will undoubtedly increase as the pups grow up. The entire cost of construction of the kennels and keeper's quarters has been \$884.07 up to date as per itemized statement herewith appended.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

TUBERCULIN TEST OF DAIRY CATTLE, CITY AND COUNTY OF
HONOLULU, 1912.

| | Tested. | Passed. | Condemned. |
|-------------------------|---------|---------|------------|
| Wm. Gomes | 10 | 9 | 1 |
| J. H. Cummings..... | 5 | 5 | 0 |
| D. P. R. Isenberg..... | 337 | 312 | 25 |
| Marshall & Azevedo..... | 28 | 26 | 2 |
| P. M. Pond..... | 37 | 36 | 1 |
| M. Gomes | 28 | 28 | 0 |
| H. B. Brown..... | 13 | 13 | 0 |
| S. J. Grace..... | 5 | 5 | 0 |
| Capt. Hartman | 3 | 3 | 0 |
| J. E. Faria..... | 20 | 20 | 0 |
| R. Compos | 12 | 12 | 0 |
| Frank Gouveira | 24 | 24 | 0 |
| J. Quintal | 2 | 2 | 0 |
| J. M. Whitney..... | 10 | 9 | 1 |
| T. F. Farm | 45 | 42 | 3 |
| Omai Tatsuchi | 10 | 10 | 0 |

| | Tested. | Passed. | Condemned. |
|----------------------------|---------|---------|------------|
| F. C. Krauss | 1 | 1 | 0 |
| K. Inouye | 8 | 8 | 0 |
| W. P. Alexander..... | 5 | 5 | 0 |
| I. Nagaki | 15 | 15 | 0 |
| J. H. Cummings..... | 4 | 4 | 0 |
| Mrs. C. M. White..... | 10 | 9 | 1 |
| Frank Medeiros | 12 | 12 | 0 |
| P. Miyakawa | 13 | 13 | 0 |
| J. Allencastro | 7 | 7 | 0 |
| K. Yamashita | 7 | 6 | 1 |
| S. Hiarata | 14 | 14 | 0 |
| C. K. Quinn..... | 6 | 6 | 0 |
| Chas. Frazer | 1 | 1 | 0 |
| College of Hawaii..... | 15 | 15 | 0 |
| H. E. Cooper | 15 | 15 | 0 |
| Frank Andrade | 81 | 80 | 1 |
| Kawaihāo Seminary | 15 | 15 | 0 |
| Mrs. Mary Quintal | 8 | 8 | 0 |
| S. Tsumoto | 9 | 9 | 0 |
| M. Kawamura | 6 | 6 | 0 |
| Mrs. W. W. Hall..... | 1 | 1 | 0 |
| G. L. P. Robinson..... | 5 | 5 | 0 |
| Frank Valph | 6 | 6 | 0 |
| Chas. Bellina | 138 | 112 | 26 |
| S. de Nobriga..... | 13 | 13 | 0 |
| Oahu College | 12 | 12 | 0 |
| Manuel Abreau | 3 | 3 | 0 |
| John Rezants | 13 | 13 | 0 |
| C. J. Day..... | 5 | 5 | 0 |
| Geo. Wond | 18 | 18 | 0 |
| Antone Pires | 8 | 8 | 0 |
| Geo. Holt | 37 | 35 | 2 |
| Kamehameha Schools | 44 | 42 | 2 |
| W. E. Miles..... | 17 | 16 | 1 |
| Frank Correa | 13 | 12 | 1 |
| Mrs. Mary Riedell..... | 10 | 9 | 1 |
| Victornia Souza | 35 | 33 | 2 |
| Alexander Young Dairy..... | 46 | 46 | 0 |
| Desidero Tello | 2 | 2 | 0 |
| John P. Mendonca..... | 10 | 10 | 0 |
| L. C. Fernandez..... | 8 | 8 | 0 |
| J. G. Silva..... | 4 | 4 | 0 |
| A. Wilder | 2 | 1 | 1 |
| Richard Kapena | 2 | 1 | 1 |
| A. Tavash | 3 | 3 | 0 |
| Mrs. E. Johnson..... | 2 | 2 | 0 |
| S. M. Damon..... | 148 | 143 | 5 |
| Galt & Carter..... | 13 | 13 | 0 |
| M. Ota | 1 | 1 | 0 |
| Chas. Bellina | 28 | 28 | 0 |
| Chas. Lucas | 90 | 80 | 10 |
| S. M. Damon | 182 | 178 | 4 |
| P. M. Pond..... | 327 | 317 | 10 |
| O. R. & L. Co..... | 1403 | 1390 | 13 |
| Y. Ogawa | 4 | 4 | 0 |
| J. A. Templeton..... | 37 | 35 | 2 |
| Iaie Plantation | 16 | 15 | 1 |
| Industrial School | 48 | 48 | 0 |
| F. S. Lyman..... | 17 | 17 | 0 |
| E. K. Elsworth..... | 1 | 1 | 0 |

| | Tested. | Passed. | Condemned. |
|---------------------|---------|---------|------------|
| J. Coonradt | 3 | 3 | 0 |
| Waianae Ranch | 292 | 186 | 6 |
| P. Isenberg | 129 | 116 | 13 |
| Total | 4037 | 3898 | 139—3.47% |

ASSISTANT VETERINARIAN'S REPORT.

Honolulu, April 8, 1912.

Dr. Victor A. Nørgaard, Chief of the Division of Animal Industry, Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith a report of the work accomplished during the month of March.

Tuberculosis Control.

During the past month the following dairies have been visited and the stock tested, viz :

| Date. | Owner. | T. | P. | C. |
|------------|-------------------------|------|------|----|
| March 2-4. | A. Wilder | 2 | 1 | 1 |
| | Richard Kapena | 2 | 1 | 1 |
| | A. Tavash | 3 | 3 | 0 |
| | Elmira Johnson | 2 | 2 | 0 |
| " 4-6. | S. M. Damon | 148 | 143 | 5 |
| | Galt & Carter | 13 | 13 | 0 |
| | M. Ota | 1 | 1 | 0 |
| | Chas. Bellina | 28 | 28 | 0 |
| " 5-7. | Chas. Lucas | 90 | 80 | 10 |
| " 9-11. | S. M. Damon | 182 | 178 | 4 |
| " 13-15. | O. R. & L. Co. | 341 | 336 | 5 |
| " 14-16. | " | 376 | 375 | 1 |
| " 18-20. | " | 441 | 433 | 8 |
| " 19-21. | " | 245 | 245 | 0 |
| " 23-25. | P. M. Pond | 243 | 240 | 3 |
| " 25-28. | " | 83 | 77 | 7 |
| " 26-28. | Y. Ogawa | 4 | 4 | 0 |
| | J. A. Templeton | 37 | 35 | 2 |
| | J. Coonradt | 3 | 3 | 0 |
| | F. S. Lyman | 17 | 17 | 0 |
| | E. K. Elsworth | 1 | 1 | 0 |
| | Industrial School | 48 | 48 | 0 |
| | Laie Plantation | 16 | 15 | 1 |
| " 27-29. | Waianae Ranch | 292 | 286 | 6 |
| " 30- | | | | |
| April 2. | D. P. R. Isenberg | 129 | 116 | 13 |
| | | 2748 | 2681 | 67 |

Livestock importations at the port of Honolulu since February 29, date of last meeting, are as follows:

S. S. Lurline, Mar. 13, 1912—8 mules, 4 horses, C. Brewer & Co.; 10 horses, Mr. Murphy; 1 ct. birds, Wells Fargo Ex. Co.

S. S. Sierra, Mar. 15, 1912—15 cts. poultry.

S. S. Wilhelmina—2 cts. poultry.

S. S. Manchuria, Mar. 25, 1912—6 lap spaniels, T. Shiwara (quarantined).

S. S. Virginian, Mar. 29, 1912—4 mules, A. M. Dept.; 1 ante-lope, Geo. Rodiek.

S. S. Tenyo Maru, April 4, 1912—2 cts. Japanese games.

S. S. Sierra, April 5, 1912—19 cts. poultry.

Respectfully submitted,

L. N. CASE,
Asst. Territorial Veterinarian.

DOG QUARANTINE STATION.

Honolulu, April 24, 1912.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry,

Honolulu, T. H.

Sir: For the purpose of obtaining an allotment of \$1,000 for the use of the division of animal industry in enlarging and improving the premises, quarters and equipment now available for the quarantining of dogs arriving here from the mainland of the United States and other countries where the disease known as rabies or hydrophobia exists, or, in other words, for enforcing and effectively carrying out the provisions of Rule VI of this division, I have the honor to lay before you such facts and conditions as have developed during the short period since the promulgation of the said Rule, and which, in my opinion, makes it imperative that such appropriation should be made without delay.

That rabies is rampant among dogs in San Francisco cannot be denied. We learn from the daily papers of that city that at the inquest on the body of a man who recently died from hydrophobia, having been bitten by his pet terrier some five weeks previously, the verdict of the coroner's jury recommended that the dog muzzling regulation recently enacted by the board of supervisors be strictly enforced, while the pound-master reports 1011 head of unlicensed dogs caught and destroyed during the month of March "because of the numerous recent cases of dog bites." That only one case of hydrophobia in man has been reported so far is undoubtedly due to an effort on the part of the authorities to suppress the facts. Under date of March 18th the federal inspector in charge of the port of San Francisco writes me, referring to the prevalence of hydrophobia: "A few days ago we had a case in my own neighborhood where four or five dogs were found to be rabid and over a dozen people had been bitten by them."

As this is the first time that an epidemic of rabies has occurred in San Francisco it may be taken for granted that the efforts of the authorities to combat the disease is being met with the usual obstructions of the skeptic and the ignorant. This is evidenced by the published facts that the first human victim was ridiculed and told not to worry, when he presented himself for treatment and expressed his fears of hydrophobia. It is therefore safe to conclude that numerous cases are being kept away from the authorities until they develop either the furious or the paralytic form of the disease, that is, until they have done all or most of the harm they can do by transmitting the disease to man or beast, and the epidemic is therefore bound to increase in extent as well as in number of cases, as is invariably the fact in newly-invaded territory, until the public becomes educated through bitter experience to the necessity of coöperation with the authorities in suppressing the disease. And that is exactly what is going to occur here if a single infected animal should gain entrance to the Territory and develop the disease before apprehended. For this reason it has been forcibly impressed on me of late that we must do everything possible to gain the confidence and coöperation of the public and especially of incoming tourists or returning residents who are accompanied by dogs. Every dog owner is as a rule a dog fancier or a dog enthusiast and nothing is more objectionable, not to say horrible, to such as the idea of having the canine pet, pal or companion put in quarantine, something on a par with having a member of the family confined in the state prison. This, in connection with the unfortunate length of the quarantine which the nature and course of the disease makes imperative, suggests that the premises where the animals are to be confined be made as comfortable and attractive as possible in order to make the prolonged segregation resemble imprisonment as little as possible and thereby induce the owners to comply with the requirements of the law instead of trying to evade them.

With these facts in mind I have planned and built the present quarantine kennels, in so far as the funds allotted for the purpose have allowed. Attractiveness and comfort had, however, to yield to hygiene and space, and these two most important requirements for a modern sanitary quarantine station were provided to the utmost extent possible with the means at hand. On the basis of the average arrival of dogs in the Territory for the past few years, and estimating that the quarantine regulation would halve this number, it was suggested to the board that provision be made for the segregation of twenty-four dogs at any one time, which would limit the admission of dogs into the whole Territory to seventy-two head per annum, or considerably less than half the usual number. In the opinion of the board, however, the quarantine regulation

would practically put a stop to the importation of dogs, and provision was made for only **twelve** kennels. At the present writing there are fourteen dogs in quarantine, with less than half of the first four-month quarantine period gone, and three more dogs, which are known to have been shipped, may arrive at any time. That will tax the station to its utmost capacity as the animals cannot, as a rule, be doubled up without prolonging the quarantine period for the original occupants of a given kennel, as all the animals in one kennel must remain until the last one has finished the four months' time of segregation, which will compel the first occupant of the kennel to remain five months in quarantine.

In regard to the present equipment of the kennels the past month has demonstrated that shade by means of flies or awnings must be provided. All of the long-haired dogs are suffering from the heat and are continually endeavoring to relieve this condition by digging themselves down into the sand. Some of the owners have provided a tent fly for the kennel in which their dogs are confined, with the result that all the other owners have demanded that such flies be provided for their dogs. As this demand in my opinion is only reasonable I would suggest that funds be allowed for this purpose. The dogs in the unprotected kennels are panting badly during the entire day and as summer is approaching the condition will naturally get worse. For the same purpose—keeping the dogs cool—a bathing tank or swimming pool must be provided, in a separate enclosure, where overheated dogs can be given a chance to recuperate.

The dogs now confined in the station have cost their owners more than \$1,000, and I do not consider that these animals are any too well protected from theft, even though the keeper spends most of his time, both night and day, among them. For this reason I would recommend that both the outside as well as the inside of the dog division be strengthened in such a way that entrance from the outside cannot be effected for unlawful purposes.

As stated, the kennels provided for the enforcement of Rule VI are practically full, only two of the smallest ones, those for lap dogs, being vacant. I would therefore recommend that at least six more kennels be built immediately and even this number I do not consider sufficient to accommodate the normal arrival of dogs, even when the regulations become fully known, and its existence is called to the attention of visitors and returning residents bringing dogs with them. Food must be provided and properly prepared, and as the secluded location of the station makes it difficult to get goods or provisions delivered regularly it becomes obvious that the keeper must be provided with means for obtaining the provisions and for pre-

paring them. I have so far provided the keeper with a saddle horse, but he cannot carry three or four quarts of milk and half a dozen loaves of bread, to say nothing of meat, rice and other necessaries, on horseback. He must, consequently, be provided with some means of transportation, especially so long as his own living is to be considered, and his absence from the station should be limited to the shortest possible time. Merchants will **not** deliver regularly small or cheap quantities of provisions at an isolated place like the station, so they have to be fetched. Furthermore, to require a man to live there and to be there night and day—to be responsible for the animals he has charge of—and then, on a salary of \$45 a month, to compel him to provide housekeeping facilities for himself, I fear is asking a little too much. I have kept Mr. Davenport, the keeper, at my house for the past two months, at an expense of at least \$25 per month, but could not afford to continue to do so, besides furnishing him a horse to use in getting to and from the station. Since taking up permanent residence at the station he has slept on a cot in the enclosure among the dogs, the unwarranted publication in the daily papers of quarantined dogs having been seen on Fort street regularly, making him apprehensive of attempts to remove certain animals during his absence. He has, so to speak, been living the life of a dog, with the inevitable result that he has given me notice that he is ready to quit when the next transport for San Francisco arrives. How and where to find a man to take his place I am unable to say and I would therefore earnestly request that a sufficient allotment of funds be granted for the extension and improvement of the kennels and quarters so as to make it possible for a man who is both willing and anxious to do so, to care for and protect the animals of which he has been placed in charge.

(Dr. Norgaard here inserts an itemized statement of what is needed, the total cost being \$1,000.—Ed.)

That awnings or flies over the kennels are necessary will be seen from the fact that the owners of quarantined dogs, in four cases, have provided such protection against the sun as they were able to afford, ranging from the regular army tent fly, costing ten dollars, to an old sheet. A letter from another owner requests that such shelter be provided for his dog, which is detained against his will, and claims as his right under the circumstances that every means to make the animal comfortable during the prolonged confinement be provided. The letter is appended herewith.

A letter from Melbourne states that six trained dogs will arrive here on the next Makura, leaving Sydney May 6. The owner requests permission to land them without quarantine under cover of a certificate of health issued by a sanitary offi-

cial. After consultation with the members of the committee on animal industry, I notified the Honolulu Amusement Company that the dogs would have to go into quarantine upon arrival and suggested that the said company cable the owners to that effect. This they did not consider necessary, stating that the dogs would probably be shipped direct to the coast on the same steamer when it was learned on arrival that they could not perform here.

A deputation of officers from Schofield Barracks called on me last week, requesting that a branch quarantine station for dogs be established at Leilehua and placed in charge of the cavalry veterinarian stationed there. The officers were advised to make a written application to the board, giving their reasons why this should be done.

In concluding this subject I beg to emphasize that I consider the rabies situation as an extremely serious matter, as the introduction of the disease into the Territory would prove nothing short of a calamity, which undoubtedly would result in the sacrifice of a number of human lives. With the nearest Pasteur Institute 4,000 miles away and without means for sending indigent patients there for treatment—it would cost at least \$500 for each person bitten to obtain treatment in either St. Louis or Austin, Texas—it would seem that no step to prevent the entrance of the disease should be neglected or overlooked. And as already stated, the most important means to this end is to gain the confidence and the coöperation of the dog owners by providing safe, sanitary and comfortable quarters for quarantine. In the meantime I would suggest that steps be taken to reduce the principal means of transmitting the disease—the stray and ownerless dog—to the smallest possible minimum. There are hundreds and hundreds of such dogs roaming the streets of Honolulu by day and infesting the alleyways and back yards by night in quest of food, upsetting garbage cans, killing poultry, fighting among themselves and altogether providing one of the worst nuisances with which the city is afflicted, and one which is invariably noticed by the tourist before anything else, and which makes him wonder—if a dog owner—why these stringent quarantine regulations, when no other efforts are being made to protect the inhabitants as well as the decent dogs from the numerous external as well as internal parasitic diseases with which the scavenger dog is affected. A letter from this board to the proper authority under whose jurisdiction the enforcement of the dog license act comes, whether the board of health or the board of supervisors, should be sufficient, under the present circumstances, to cause a speedy reduction in the ranks of these dangerous and often repulsive "friends of man." A general dog muzzling act, which is always the first step to be taken when rabies

makes its appearance, would be impossible of enforcement here at the present time, and would have to be preceded by wholesale slaughter, before a systematic reduction of the canine inhabitants could be effected. This, however, can be done now, and no dog owner, whether he has neglected to take out a license for his dog or not, need to lose him, as there is still time for advertising and redeeming, which would not be the case if the disease broke out here with the authorities unprepared for handling the large number of dogs which soon would crowd the pounds.

That no funds are available for the enforcement of the dog license act should not be advanced. The dog holds the same position in regard to rabies as the mosquito does to yellow fever, and the extermination, or at least control, of the one is no more important than the other. In either case the stake is a human life.

The enforcement of Rule VI has proved an extremely unpleasant duty and I trust the board can see its way clear to assist this division in making it less onerous by granting the means for the enlargement and improvements enumerated.

Other Business.

For the information of the board I submit herewith the report of the assistant Territorial veterinarian pertaining to the control of bovine tuberculosis, showing that the annual test has practically been finished. The results are highly gratifying, not alone on account of the practical eradication of the disease, but also on account of the effect which the repeated visits to each dairy, accompanied by the county milk inspector, has had in educating the dairy owners up to employing more modern and sanitary methods and utensils in producing clean milk. The recent report of the food commissioner of the board of health on this subject, even though it failed to place the credit where it belonged, is ample proof of the immense progress which the concerted efforts of the various sanitary authorities connected with this problem has had upon the milk supply of Honolulu. That this good work should be extended to the other islands there can be no doubt, and this proposition will be made the subject of a special report to the board in the near future.

Some of the more important correspondence of the division is also submitted for the information of the board.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, April 30, 1912.

Dr. Victor A. Norgaard, Chief, Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I have the honor to submit herewith a report on the work so far accomplished in the eradication of bovine tuberculosis:

During the past month 702 animals were tested with 14 reactions, a percentage of 1.99 per cent. tuberculosis. The districts covered were Aiea, Pearl City, Ewa and Waimano. The tabulated results of the various tests is as follows:

| | | T. | P. | C. |
|------------|-----------------------|-----------|-----------|----------|
| April 4-6. | Tom Quinn | 5 | 5 | 0 |
| " 8-10. | S. Boyama | 5 | 5 | 0 |
| | Y. Nakamura | 5 | 5 | 0 |
| | J. Schwank | 5 | 5 | 0 |
| | F. Johnson | 9 | 8 | 1 |
| | E. C. Smith..... | 9 | 8 | 1 |
| | I. Morioko | 22 | 19 | 3 |
| " 9-11. | R. McKeague | 4 | 4 | 0 |
| | I. Moniz | 2 | 2 | 0 |
| | A. Reis | 2 | 2 | 0 |
| | S. Tado | 9 | 9 | 0 |
| | K. Shimidsu | 2 | 2 | 0 |
| | C. E. Eckland | 2 | 2 | 0 |
| | T. Fugita | 2 | 2 | 0 |
| | N. Kimoto | 2 | 2 | 0 |
| | F. De Mello..... | 8 | 7 | 1 |
| | S. M. McKeever..... | 2 | 2 | 0 |
| | R. T. McGettigan..... | 2 | 2 | 0 |
| " 18-20. | H. Focke | 8 | 4 | 4 |
| " 22-29. | O. R. & L. Co..... | 597 | 593 | 4 |
| | | <hr/> 702 | <hr/> 688 | <hr/> 14 |

In the above list the dairy of H. Focke shows the highest percentage, four of the eight animals tested being condemned as tuberculous. That such a condition was found to exist after the number of tests made is due to the fact that the animals condemned on previous tests were allowed to remain in the dairy and spread the infection. At the present time there is in the dairy an animal which has reacted to the test four times, the reaction being in each case typical, still through stubbornness—the owner cannot plead ignorance of the dangers as he has been well informed—and the fact the animal in question was a good milker, she was allowed to remain with the result that on the present test 50% of the cows reacted. Better evidence of the rapid spread of the

disease in a dairy through the presence of one tuberculous animal could not be wanted.

It is hard to understand why, after the large amount of work which has been done and the effort which has been made on the part of the officials of this division to educate the dairymen, giving them the best and latest information on the subject and advising them as to the most economical methods to follow in eradicating the disease, such a condition should exist. In this instance the experience has been a costly one, and one calculated to allay all further opposition to the carrying out of methods of complete eradication of the disease. I am glad to report that instances of this kind are rare and that opposition to the carrying on of the work of the eradication of bovine tuberculosis has died down and in its stead has sprung up a keen desire on the part of dairymen to offer every help possible.

This year's general test of the dairy herds of the island of Oahu is nearing completion and the results are gratifying, indeed. Up to the present time figures show the following:

| Total Number Tested. | Total Number Passed. | Total Number Condemned. |
|-------------------------|-------------------------|----------------------------|
| 4,379 | 4,586 | 153 |

From the above figures it will be seen that the percentage of tuberculous animals up to the present time is 3.22%. There remains in the neighborhood of fifteen hundred animals still to be subjected to the test, but as these are owned by the O. R. & L. Co., and as the percentage of diseased animals among their stock is very low, indeed, being less than 1%, the addition of these to the total number will lower the final percentage of tuberculous animals.

That the campaign against bovine tuberculosis is meeting with success is evidenced by the marked decrease in the percentage of tuberculous animals among the dairy herds of the city and county since the beginning of the work in 1909. This is brought out clearly in the following figures:

| | T. Tested. | T. Passed. | T. Cond. | Per- centage. |
|---|------------|------------|----------|------------------|
| First Test..... | 1,916 | 1,475 | 441 | 23.01% |
| Second Test | 4,152 | 3,930 | 222 | 5.34% |
| Third Test (uncom- pleted) | 4,739 | 4,586 | 153 | 3.22% |

In the three years which this work has been going on the percentage has been brought from one quite large, 23.01%, to one quite small, 3.22%, and which may be smaller yet when the test is completed. This is making rapid strides toward the time when bovine tuberculosis among dairy stock on the island of Oahu will be a thing of the past and when this, the third general test, is finished we will have advanced a long way toward the eradication

of this disease in the entire territory. We have taken a step and, although the step is a large one, still we realize that it is but a step and that there remain the other islands to be considered before we can call the Territory of Hawaii rid of this fatal and rapidly spreading disease.

The method of testing, i. e., intra-dermal, which has been in use during the past two years, has proven itself a great success in the handling of the large numbers of stock, some of which are very wild, necessary in making a complete test. Perhaps its greatest advantage lies in the fact that it presents to the dairy owner a marked difference between a reactor and a non-reactor, in other words, between a sick and a well animal, it presents to him a reaction he can see and feel though he may not comprehend and thus in large measure he is satisfied.

This feeling of satisfaction on the part of the owner is of immeasurable value in the prosecution of a campaign of eradication against such a disease as tuberculosis where slaughter of the animal is absolutely necessary if the disease is to be stamped out. Especially is this satisfaction necessary where the work is undertaken among a population of extremely varied nationalities. One may enter into explanation and show temperature charts and try to explain to a Japanese or Portuguese why this animal must be condemned and the one next to it may be passed, although one looks no more sick than the other, but as a rule no impression will have been made and he is very backward about having the animal killed, but if, as is possible, in this test, you can show him a swelling in the sick animal and none in the well one, here is something that, as a rule, will satisfy him. This then is a great advantage which this test possesses and will urge its general adoption in the control of bovine tuberculosis, not to mention its other advantages in the saving of time, labor and expense, and we have proved, to our own satisfaction at least, its equal reliability with the subcutaneous method.

So much for the method and the work accomplished with it. A discussion of its technique and application cannot be entered into here but will be dealt with in a separate report.

A word now as to the general condition of the dairies from a sanitary standpoint. To one who had an opportunity of observing the conditions three years ago, a marked improvement is evident. Under the supervision and instruction of the city and county milk inspector, new barns have been built and cement floors laid; milk rooms are fast becoming the rule instead of the exception, greater care is being exercised in the handling and cleaning of both utensils and animals and the drawing of the milk. Coolers are being installed in many dairies, even in the smaller Japanese dairies, and with a decided beneficial effect on the product. Although there is still room for improvement great advances have been made in the production of milk in a sanitary manner. The constant visits of the milk inspector have a very

beneficial effect in keeping these improvements in operation and allowing of no slackness or discontinuance when once adopted.

The importation of live stock at the port of Honolulu for the past month are as follows:

April 4, Tenyo Maru, 2 cts. Japanese games; April 5, Sierra, 19 cts. poultry; April 9, Lurline, 28 mules, A. & B., 5 horses, A. & B., 9 cts. poultry; April 16, Wilhelmina, 5 dogs, 2 cats, 1ct. rats, 2 cts. pigeons, 9 cts. poultry; April 20, Mexican, 2 horses, Q. M. Dept.; April 24, Honolulu, 43 mules, 1 stallion, Schuman; 11hogs, H. J. Brown; 5 cts. poultry; April 24, Zealandia, 2 dogs; April 26, Sierra, 23 cts. poultry; April 29, Shinyo Maru, 4 cts. Japanese games.

Respectfully submitted,

LEONARD N. CASE,
Asst. Territorial Veterinarian.

DAIRY CATTLE INSPECTION, 1909-1912.

| | T. | P. | C. |
|------------------------------|-----|-----|----|
| 1. Wm. Gomes | 100 | 9 | 1 |
| 2. J. H. Cummings | 5 | 5 | 0 |
| 3. D. P. R. Isenberg | 337 | 312 | 25 |
| 4. Marshall & Azevedo | 28 | 26 | 2 |
| 5. P. M. Pond | 37 | 36 | 1 |
| 6. M. Gomes | 28 | 28 | 0 |
| 7. H. B. Brown | 13 | 13 | 0 |
| 8. S. J. Grace | 5 | 5 | 0 |
| 9. Capt. Hartman | 3 | 3 | 0 |
| 10. J. E. Faria | 20 | 20 | 0 |
| 11. R. Compos | 12 | 12 | 0 |
| 12. Frank Gouveira | 24 | 24 | 0 |
| 13. J. Quintal | 2 | 2 | 0 |
| 14. J. M. Whitney | 10 | 9 | 1 |
| 15. T. F. Farm | 45 | 42 | 3 |
| 16. Omai Tatsuchi | 10 | 10 | 0 |
| 17. F. C. Krauss | 1 | 1 | 0 |
| 18. K. Inoue | 8 | 8 | 0 |
| 19. W. P. Alexander | 5 | 5 | 0 |
| 20. I. Nagaki | 15 | 15 | 0 |
| 21. J. H. Cummings | 4 | 4 | 0 |
| 22. Mrs. C. M. White | 10 | 9 | 1 |
| 23. Frank Medeiros | 12 | 12 | 0 |
| 24. P. Miyakawa | 13 | 13 | 0 |
| 25. J. Allencastro | 7 | 7 | 0 |
| 26. K. Yamashita | 7 | 6 | 1 |
| 27. S. Hiarata | 14 | 14 | 0 |
| 28. C. K. Quinn | 6 | 6 | 0 |
| 29. Chas. Frazer | 1 | 1 | 0 |
| 30. College of Hawaii | 15 | 15 | 0 |
| 31. H. E. Cooper | 15 | 15 | 0 |
| 32. Frank Andrade | 81 | 80 | 1 |
| 33. Kawaiahao Seminary | 15 | 15 | 0 |
| 34. Mrs. Mary Quintal | 8 | 8 | 0 |
| 35. S. Tsumoto | 9 | 9 | 0 |
| 36. M. Kawamura | 6 | 6 | 0 |

| | T. | P. | C. |
|--------------------------------|------|------|----|
| 37. Mrs. W. W. Hall..... | 1 | 1 | 0 |
| 38. G. P. L. Robinson..... | 5 | 5 | 0 |
| 39. Frank Valph | 6 | 6 | 0 |
| 40. Chas. Bellina | 138 | 112 | 26 |
| 41. S. de Nobriga | 13 | 13 | 0 |
| 42. Oahu College | 12 | 12 | 0 |
| 43. Manuel Abreau | 3 | 3 | 0 |
| 44. John Rezants | 13 | 13 | 0 |
| 45. C. J. Day | 5 | 5 | 0 |
| 46. Geo. Wond | 18 | 18 | 0 |
| 47. Antone Pires | 8 | 8 | 0 |
| 48. Geo. Holt | 37 | 35 | 2 |
| 49. Kamehameha Schools | 44 | 42 | 2 |
| 50. W. E. Miles | 17 | 16 | 1 |
| 51. Frank Correa | 13 | 12 | 1 |
| 52. Mrs. Mary Riedell..... | 10 | 9 | 1 |
| 53. Victoria Souza | 35 | 33 | 2 |
| 54. Alexander Young Dairy..... | 46 | 46 | 0 |
| 55. Desidero Tello | 2 | 2 | 0 |
| 56. John P. Mendonca..... | 10 | 10 | 0 |
| 57. L. C. Fernandez..... | 8 | 8 | 0 |
| 58. J. G. Silva..... | 4 | 4 | 0 |
| 59. A. Wilder | 2 | 1 | 1 |
| 60. Richard Kapena | 2 | 1 | 1 |
| 61. A. Tavash | 3 | 3 | 0 |
| 62. Mrs. E. Johnson..... | 2 | 2 | 0 |
| 63. S. M. Damon..... | 148 | 143 | 5 |
| 64. Galt & Carter..... | 13 | 13 | 0 |
| 65. M. Ota | 1 | 1 | 0 |
| 66. Chas. Bellina | 28 | 28 | 0 |
| 67. Chas. Lucas | 90 | 80 | 10 |
| 68. S. M. Damon..... | 182 | 178 | 4 |
| 69. P. M. Pond..... | 327 | 317 | 10 |
| 70. O. R. & L. Co..... | 1403 | 1390 | 13 |
| 71. Y. Ogawa | 4 | 4 | 0 |
| 72. J. A. Templeton..... | 37 | 35 | 2 |
| 73. Laie Plantation | 16 | 15 | 1 |
| 74. Industrial School | 48 | 48 | 0 |
| 75. F. S. Lyman | 17 | 17 | 0 |
| 76. E. K. Elsworth | 1 | 1 | 0 |
| 77. J. Coonradt | 3 | 3 | 0 |
| 78. Waianae Ranch | 292 | 186 | 6 |
| 79. P. Isenberg | 129 | 116 | 13 |
| 80. Tom Quinn | 5 | 5 | 0 |
| 81. S. Boyama | 5 | 5 | 0 |
| 82. Y. Makamura | 5 | 5 | 0 |
| 83. J. Schwank | 5 | 5 | 0 |
| 84. E. Johnson | 9 | 8 | 1 |
| 85. E. C. Smith..... | 9 | 8 | 1 |
| 86. I. Morioko | 22 | 19 | 1 |
| 87. R. McKeague | 4 | 4 | 0 |
| 88. I. Moniz | 2 | 2 | 0 |
| 89. A. Reis | 2 | 2 | 0 |
| 90. S. Tado | 9 | 9 | 0 |
| 91. K. Shimidzu | 2 | 2 | 0 |
| 92. C. E. Eckland | 2 | 2 | 0 |
| 93. T. Fugita | 2 | 2 | 0 |
| 94. N. Kimoto | 2 | 2 | 0 |
| 95. P. De Mello | 8 | 7 | 1 |

| | T. | P. | C. |
|---------------------------|------------|------------|-----------|
| 96. S. M. McKeever..... | 2 | 2 | 0 |
| 97. R. T. McGettigan..... | 2 | 2 | 0 |
| 98. F. Focke | 8 | 4 | 4 |
| 99. O. R. & L. Co. | 597 | 593 | 4 |
| | <hr/> 4739 | <hr/> 4586 | <hr/> 153 |

DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen: I respectfully submit my report of the work of the division of entomology for the month of March as follows:

During this month we boarded 35 vessels and found vegetable matter on 20 of them. Careful inspection of all shipments gave the following results:

Disposal With Principal Causes.

| | Lots. | Parcels. |
|--------------------------------|-----------|--------------|
| Passed as free from pests..... | 512 | 14,435 |
| Fumigated | 33 | 459 |
| *Burned | 30 | 57 |
| | <hr/> 575 | <hr/> 14,951 |
| Total inspected | 575 | 14,951 |

Rice Shipments.

Thirty thousand four hundred and thirty-three bags of rice arrived during the month of March and being found free from pests were permitted to enter the Territory.

Pests Intercepted.

In a shipment of plants from Japan we found a colony of ants (*Formosa species*) and some pupas of a tipulid in the soil and a lepidopterous larva on the plants. All soil was washed off the plants after these had been fumigated in the usual manner. A passenger brought a bundle of large double flowering cherry trees. We found them badly infested with two scale insects (*Diaspis pentagona* and *Pseudaonidia duplex*), also some brown velvet lichen. The trees were refused entry and have been destroyed.

One lot of orchids arrived from Java in a very dry state, apparently dead, but we found a very lively colony of ants (*Prenolepis species*) in the package and fumigated the shipment.

A small package of mangoes in the possession of a passenger on the transport Logan from Manila was confiscated and destroyed.

Forty-eight packages of fruit and vegetables were taken away from immigrants at the United States immigrant station, which came from China and Japan.

Hilo Inspection.

Brother M. Newell reports the arrival of seven vessels at the port of Hilo, finding two vessels carrying vegetable matter consisting of 45 lots and 784 parcels, all being passed as free from pests.

Inter-Island Inspection.

During the month of March, 59 steamers were attended to and the following shipments were passed on: 148 bags taro, 54 cases plants, 20 bags taro tops; total 222; 1 package seed potatoes, 1 package hop roots, 1 package lily root, 1 package waterchestnut; total, 4; grand total, 226 packages.

The following packages were refused shipment: 30 packages fruit, 16 packages vegetables, 5 lots plants, 1 lot sugar cane, 1 lot lily roots and soil, 3 cocoanuts; total, 56 packages.

One case of tomatoes was found infested with maggots, probably those of the melon fly.

Respectfully submitted,

E. M. EHRHORN,
Supt. of Entomology.

REPORT FOR APRIL.

Honolulu, April 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen: I respectfully submit my report of the work of the division of entomology for the month of April as follows:

During this month there arrived 36 vessels, of which 24 carried vegetable matter. The usual careful inspection made, resulted as follows:

Disposal With Principal Causes.

| | Lots. | Parcels. |
|------------------------------|-------|----------|
| Passed as free of pests..... | 627 | 14,230 |
| Fumigated | 16 | 169 |
| Burned | 23 | 122 |
| Soil removed | 2 | 8 |
| Total inspected | 668 | 14,529 |

Rice Shipments.

Twenty seven thousand four hundred and forty bags of rice arrived from Japan during the month of April and being found free from pests were permitted to enter the Territory.

Pests Intercepted.

Twenty-seven packages of vegetables and 52 packages of fruit were confiscated from passengers and immigrants during the month and destroyed by burning. Examination showed much of these to be badly infested with scale insects and other pests, emphasizing that the prohibition of such materials into the Territory is a very good regulation. A passenger brought a box of plants, mostly roses, from Japan, and we found a *Lepidopterous* miner in many of the stems; the whole lot was destroyed by burning. Three boxes of sandpears from Japan arrived by parcels post for a Japanese at Papaikou, Hawaii. After passing the custom house examination, we confiscated the packages at the postoffice, giving the postmaster our receipt for the same. As fast as individuals of the large number of immigrants from the steamer Harpalion are released, we go through their belongings and we have found quantities of seeds which we subject to a strong fumigation as a precaution against hiding pests.

Hilo Inspection.

Brother M. Newell reports the arrival of 11 vessels at Hilo, 4 of which carried vegetable matter and 1 vessel ballast. There were all told 115 lots, consisting of 1827 packages of fruit and vegetables, and from this amount 5 packages of vegetables were destroyed, being in bad condition.

Inter-Island Inspection.

During the month of April 70 steamers were attended to and the following shipments were passed on: 400 bags of taro, 86 crates of plants, 2 lots of cutflowers, 1 bag of cabbage, 1 bag of cocoanuts; total, 490 packages inspected and passed.

The following packages were refused shipment: 93 packages fruit, 1 package plants, 31 packages vegetables; total, 125 packages inspected and refused shipment.

Beneficial Insects.

Four boxes of predaceous beetles (*Calosoma lugubre*) were received from Dr. W. D. Hunter, bureau of entomology, Victoria, Texas. About two years ago this matter was taken up by me and the promise then made. At the request of the president, I delivered the beetles to Mr. T. D. Fullaway of the United States experiment station; he and I carefully examined the boxes together. Out of 102 beetles, 59 arrived alive, four just showing life, and the rest died.

Miss Louise Gulick, who has acted as laboratory assistant, resigned on April 15, and Miss Maud Dawson, a teacher at the Normal school, is giving us two hours daily of her time assisting us in our laboratory work.

Owing to the change of schedule of the T. K. K. and Pacific Mail steamship lines, we have found it rather difficult to handle these vessels promptly, as on some days we have had as high as four steamers arriving at this port.

Respectfully submitted,

E. M. EHRLHORN,
Supt. of Entomology.

BOARD OF COMMISSIONERS OF AGRICULTURE AND
FORESTRY.

FRUITFLY CONTROL.

Honolulu, April 4, 1912.

FIFTH MONTHLY REPORT.

To the Commissioners, Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I submit you a report of the work of this department for the month ending March 31, 1912, viz.:

INSPECTION.

During the past month the work of inspection and destruction of infested fruits has continued on the lines previously explained. The mango season is now fairly advanced and the inspection and gathering of fallen fruits are giving both householders and inspectors much work. This also applies to kamani and other large trees bearing fleshy seeds, which are badly attacked by the fruitfly.

GENERAL CONDITIONS.

Excepting in areas devoted to vegetable gardens, general conditions, as a whole, are more satisfactory than might have been expected at this season of the year. At the beginning of the campaign inspection work included the areas in vegetables, which were generally attacked by melon fly and as a result many of the Orientals were prevailed upon to gather and destroy their infested vegetables. Since the mango season has come in, however, the inspectors are obliged to devote all of their time to Mediterranean fruitfly work and the vegetable gardens are again in bad shape in so far as melon fly is concerned. It is a difficult

matter to make the Asiatic understand why he should not "plough in" his infested vegetables instead of burning them thoroughly.

I am pleased to report that so far the mango has not shown as bad infestation of the Mediterranean fruitfly as it did last season. Many of the fruits are damaged by fungus and as a result of fermentation are attacked by species of small vinegar flies. These latter only attack fruit in a rotting or fermenting condition.

Whilst the majority of householders show a marked willingness to coöperate in the work of "clean culture," there are very many who appear irritated at the continual calls of inspectors. These latter householders apparently do not appreciate the fact that if they kept their premises free of ripe or infested fruits, there would be little occasion for continued inspection. As a whole, however, most of the residents are pleased to have their attention called to any insanitary horticultural conditions on their premises.

INSULAR CONDITIONS.

The organization of special committees to superintend the campaign in the districts of Hawaii and Maui is now complete. Commissions have been issued to the members of committees as special agents of the Board, whilst the inspectors named by the committees have received their official appointments.

The allotment by the "conservation fund committee" of \$3500 to Hawaii and \$1000 to Maui to assist in their campaign to either control or prevent the introduction of the Mediterranean fruitfly in their several districts, has been pro-rated in a manner apparently satisfactory to all concerned. Letters of appreciation for the financial assistance granted have been received from a number of the committees. The cost of inspection, over and above the amount allotted, will be paid out of funds locally contributed in each district.

I am sorry to say that the fruit material received from Kona, about which I previously reported, has bred out the Mediterranean fruitfly. That district and Kohala are the only two on Hawaii where, so far as is at present known, infestation exists. It is to be hoped that the system of inspection at points on the belt roads leading out of Kohala and Kona will be efficient and thereby perhaps postpone for an indefinite period the introduction of the fly into the other districts. As the Inter-Island Steam Navigation Co. has given instructions to the officers on all its steamers not to carry Hawaiian fruits from infested districts, it is hoped that this coöperation, together with the vigilance of the inspectors at way ports, will greatly assist in keeping the pest away from districts so far not known to be infested.

PARASITIC WORK.

I am pleased to report that Prof. Silvestri, the well known expert at present employed by the Italian government in its economic and other entomological work in Southern Italy, has at

last obtained leave of absence from his principals and will at an early date start upon the expedition to tropical West Africa in search of a parasite for the Mediterranean fruitfly and cotton bollworm. Prof. Silvestri's services have been engaged for a period of twelve months.

GENERAL REMARKS.

Since my last report, the following have to be added to the long list of fruits or seeds infected with Mediterranean fruitfly. These, as well as others previously named, have been bred out in the Board laboratories:

Chrysophyllum oliviforme (called Damson Plum in Jamaica);
Thevetia nerifolia (locally called "Yellow Oleanda").

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.

Honolulu, May 1, 1912.

SIXTH MONTHLY REPORT.

To the Commissioners, Board of Agriculture and Forestry, T. H.,
Honolulu, T. H.

Gentlemen:—I beg to submit the report of this department for the month ending April 30, 1912, viz.:

INSPECTION.

Inspection throughout the quarantined districts in Honolulu has continued on the same lines as previously reported, the work in general including the gathering and destroying of infested fruits having been done in as thorough a manner as local conditions would admit. The mango season is almost at its height and much of the attention of inspectors has, of course, had to be given to the daily sweeping up and disposal of the fallen fruit. The percentage of mangoes found infested with the Mediterranean fruitfly is small as compared with last year. This is altogether satisfactory in view of the fact that the crop this year is unusually large.

The department has had additional work thrust on it because of the unfortunate shortage of teams and men in the county garbage system. There have been numerous complaints from householders, who do not subscribe to the garbage department, that their fruit is not carted away regularly but left to decay in containers on the sidewalks. The garbage department had promised to coöperate with the board to the extent that all fruit, if placed on the sidewalk in containers within the garbage limits, would be promptly cared for even though the householder was not a subscriber to its system. It is very unfortunate that the campaign cannot be assisted by the garbage department to the extent expected of it, and in view of existing conditions it is quite

apparent that no systematic work as to efficient disposal of fruit can be expected from the county until it adopts a free garbage system and increases its equipment. In the meantime we are ourselves hauling to the incinerator as much infested fruit as our limited means will allow. A number of householders, within the garbage limits, having sufficient trash on their premises to burn their fallen fruit, prefer that method to taking chances on a weekly or bi-weekly system of collecting as at present prevails. Furthermore, householders complain that when the fruit is not promptly carted away from the sidewalk by the garbage department, certain classes of school children rummage the containers and distribute a part of the contents on the sidewalk, where it is left to rot unless the householder troubles himself to sweep it up. The complaints referred to are not particularly against the officials of the garbage department, as these have from the beginning of the campaign shown a desire to coöperate to the best of their ability. The trouble evidently lies in the fact that there is no free garbage system and because of a shortage of teams to collect daily and bi-weekly on all thoroughfares throughout the garbage limits.

INSULAR CONDITIONS.

A sample of fruit infested with the larvae of a species of fly has been sent this department from the Waikapu district on the Island of Maui. Others gathered in Kula and Ulupalakua, Maui, by Mr. G. P. Wilder, were also turned over to us for examination. All these samples are exceedingly suspicious and it is quite probable that the Mediterranean fruitfly will be bred from at least one, if not all, of them. Should such be the case and owing to the wide range of distribution, it would go far to show that, in all probability, the fly has been on Maui for some months, but for some reason or another has not been discovered by either the local authorities or residents. The same conditions may also prevail in districts on Hawaii, where, up to the present, the pest has not been discovered. It is quite unfortunate that the lack of funds prevented Hawaii and Maui from organizing and excluding Hawaiian grown fruits from their local ports at an earlier period than they did. This they and all the other islands should have done as soon as it was reported that the fruitfly existed on Oahu.

GENERAL REMARKS.

As intimated in my last report the services of Dr. F. Silvestri have been secured for a twelve months' period to search for specific parasites on the Mediterranean fruitfly and cotton bollworm. Final instructions were sent to Dr. Silvestri about three weeks ago and he is probably on his way to tropical West Africa by this time. Two or three months ago I communicated with the minister of agriculture for West Australia in connection with

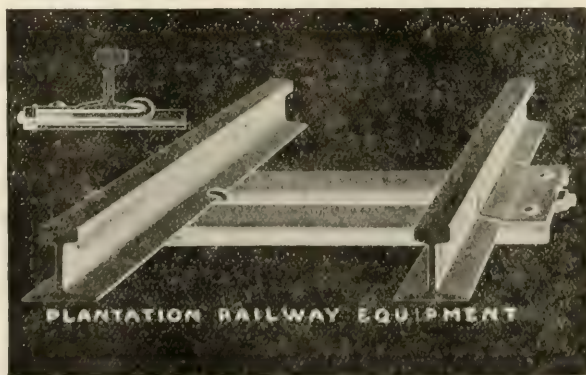
a parasite which has been introduced there some years ago, but which, so far as is known, has not become established. This particular parasite was supposed to attach itself to a species closely allied to our local melon fly (*Dacus cucurbitae*) and it has been said that it would incidentally attack the Mediterranean fruitfly (*Ceratatis capitata*). Efforts are being made by this department to secure a colony of this particular parasite for experimental purposes, but it is doubtful whether it can be obtained from Australia for the reason above stated, viz., that, so far as is at present known, it never established itself under natural conditions. On this point I expect to hear definitely in a month or more.

This department continues to receive the coöperation of the U. S. Experiment Station and has concluded arrangements with Dr. E. V. Wilcox, its director, that all parasitic material received from the fruitfly and cotton bollworm campaign shall be solely handled by his entomologist.

Mr. Weinland, the agent of the California State horticultural commission, continues to coöperate with this department in its present campaign. Besides assisting in the inspection of fruits intended for export, he is devoting much time to "trapping" and poisoned spray experiments. Mr. Weinland also keeps himself informed as to fruitfly conditions in general on Oahu.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruitfly Control, T. H.



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H. B. Elliot, *Deputy Territorial Veterinarian for Hilo, Hawaii.*
J. C. Fitzgerald, *Deputy Territorial Veterinarian for Maui.*
A. R. Glaisyer, *Deputy Territorial Veterinarian for Kauai.*

CLERICAL STAFF

Geo. R. Clark, *Secretary to the Board.*
Mrs. C. L. Seybolt, *Clerk.*
Miss Anna K. Harrison, *Librarian.*
Daniel Logan, *Editor of the "Forester."*

PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 7, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables, etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiawhiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION OF ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws, 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

VOL. IX.

JUNE, 1912

No. 6

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

JUNE, 1912.

No. 6.

The Forester acknowledges the receipt of a small library in one package, of Proceedings of the California Academy of Sciences, fourth series. There are four treatises bearing on the expedition of the Academy to the Galapagos Islands, 1905-1906, in which, respectively, Francis X. Williams deals with the butterflies and hawk-moths, John Van Denburgh with the snakes, Alban Stewart with the botany, and Mr. Van Denburgh, again, with the geckos of the islands. Mr. Van Denburgh is also the author of "Notes of a Collection of Reptiles from Southern California and Arizona;" James Perrin Smith, of a pamphlet on the "Geologic Range of Miocene Invertebrate Fossils of California," and Frank M. Anderson, of one containing 146 pages besides many interleaved illustrations on "The Neocene Deposits of Kern River, California, and the Temblor Basin." These documents will be a valuable addition to the scientific works in the library of the Territorial Bureau of Agriculture and Forestry.

Work conducted at the Pasteur Institute at Nha-Wang, Cochinchina, has shown that the employment of a special virus for producing epidemics among rats is not to be considered as a serious method of reducing the numbers of these rodents. The disease produced by the virus shows at first a great activity, but the ultimate effect is to produce a race of rats that are immune to it.

Somewhat peculiar results have followed the rubber boom in Singapore. More and more land has been planted in Para rubber, until at the end of last year the area under cultivation was about 14,000 acres. The planting of this tree in every corner, even in quite unsuitable localities and in small patches, caused a remarkable diminution in the supply of vegetables, fruit, poultry, and even pigs, many Chinese abandoning other occupations to plant rubber.

Natal has experienced the advent of the San Jose scale, but the agricultural authorities hope to keep it in subjection through the methods of control which severe experience has brought to a high standard in the United States, and of which other countries that may be visited by the pest can now have the benefit.

The exports of cacao from Trinidad continue to increase in quantity, 57, 858,640 pounds, of the value of \$6,150,485, having been exported in the year 1910. Rubber is receiving much attention in that island. There has been a considerable importation of thoroughbred livestock the past year.

Experiments made in cotton growing at the agricultural station, Tamale, on the Gold Coast, Africa, have given most unsatisfactory results. An official report says that unless better returns can be shown in the future it would appear that cotton cannot be successfully grown for export.

Mr. D. P. R. Isenberg has tendered his resignation as a member of the board of agriculture and forestry, on account of intended absence from the Territory for some time. It will not be easy to find one to take his place, with the practical knowledge and business sagacity he has brought to the board.

Attempts made the past two or three years to introduce the Lima bean into Manchuria have been abandoned, on account of the expense incurred in protecting the seedlings from high winds.

BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

FRUIT FLY CONTROL.

Seventh Monthly Report.

Honolulu, Hawaii, June 1, 1912.

To the Commissioners, Board of Agriculture and Forestry,
Territory of Hawaii, Honolulu.

Gentlemen:—I beg to submit the following report for the month ending May 31, 1912, viz.:—

It is quite fortunate that the quarantined area in Honolulu and suburbs has been kept fairly clear of all ripe and overripe fruit other than the mango, of which latter there is an unprecedented crop. Our small staff of inspectors has been kept busy in an almost futile endeavor to keep all grounds clear of

this fruit, the tree of which is now in full bearing. It takes but a glance at the number and fruiting conditions of these scattered trees to realize the stupendous work of efficiently gathering and destroying a fruit which during the season is continuously falling from all these large trees day and night. It is almost unnecessary to say that with such immense crops of mangoes extending over a period of three months or more perfect work in gathering and destroying these cannot be expected, more particularly under the peculiar local conditions which exist in the area of approximately 50,000 acres under quarantine between Kaimuki and Moanalua. To properly cope with such conditions, it would take a force ten times as large, and even then the work would be partially ineffective unless a very much larger proportion of householders co-operated. Of course, there are many who keep their grounds fairly free of fallen mangoes, but the large majority of residents, and particularly those who can ill afford to employ a yardboy, leave the gathering of this fruit to our inspectors and such laborers as we are now forced to employ at odd times to help out the situation. Even where mangoes are not used by householders, there are but few, including the wealthier class, who voluntarily strip the trees or care to have this done for them. Again, there are a large number of vacant lots containing mango trees, the owners or controllers of which it is difficult to locate. In the majority of such instances as these we will be obliged to strip and gather the fruit ourselves, as well as cart the same to the incinerator, if there is not sufficient brush to burn same on the premises. During the month we have had a wagon busy hauling several loads of such fruit every day, and during June, if the payroll will stand it, several more carts and day laborers will have to be employed. It is surprising what immense quantities of this fruit have been burned on the ground or else carted away to the incinerator since the season opened, all of which would have been left as formerly, to ferment and rot on premises, causing not only a very insanitary condition in localities, but also would have been the means of an altogether unnecessary reproduction of fruit flies in countless numbers. Unfortunately there is a very bad fungus condition existing in much of the mango fruit which is causing it to rot and ferment before falling. This fermentation attracts numerous species of vinegar flies, the small maggots of which give the impression that the fruit is all infected with the Mediterranean fruit fly. Such is not the case, but nevertheless many of the fruits are really attacked by the latter pest and it is impossible to discriminate amongst such large quantities as daily fall to the ground. Whilst there is much good fruit on many of the trees and on the ground it is best to be on the safe side and sweep up and destroy every one that has fallen. I am dwelling at some length on these pecu-

liar conditions, as they are liable to happen to a more or less extent every summer during the mango season, and they go far to prove what I have tried to impress upon the authorities and others from the start, that it is useless to expect either a perfect control of the Mediterranean fruit fly in Honolulu and suburbs with a comparatively small appropriation and without that unity and coöperation of all residents which is so necessary in all artificial methods of control when these are performed in non-commercial areas. Without such unity and without such coöperation, even an appropriation of many more thousands of dollars will not be as effective as it should be. With conscientious and efficient work, however, clean culture and allied artificial methods, together with the proper coöperation of householders, will produce results in proportion to the amount expended. To a great extent this has already been manifest to proficient and unprejudiced investigators. Such mechanical work when performed by all in a proper spirit of coöperation can do no more than partially control this pest. In a tropical country like ours the so-called eradication or extermination of such a pest as Mediterranean fruit fly by mortal man is not possible. That it has been in a measure controlled or lessened in numbers by climatic conditions and artificial methods in other parts of the world is fairly well accepted, but such countries as have recorded these facts practically all have their fruits growing in orchards on a commercial scale, and again some of them have a mild winter frost which occasionally checks the pest. Few places have a similar environment and tropical jungle of fruits all the year round as we have at our back doors. To a more or less extent very good results should obtain here, provided the same unity and coöperation existed amongst all our residents as occurs in other places where large commercial interests are at stake. The point was raised by me early in the campaign as to the desirability of expending such a comparatively small appropriation as that which we are working with and then expecting great results in view of local economic conditions, not only on this island, but also on others of the group. We have few fruits of commercial importance other than the banana and pine, and these latter, under natural conditions, are so far not attacked by the fruit fly. When it is considered that artificial methods of control, such as clean culture, spraying, etc., etc., means a continuity of immense appropriations, are not some people expecting too great results all at once from a comparatively small fund? Even the \$35,000 which it appears Congress will eventually appropriate to assist in this campaign will be but a drop in the bucket considering the scattered jungles of fruit trees in Honolulu and vicinity and the wild and mountainous expanses of territory here and on all the islands. These large areas not only have the guava and

mountain apple on the slopes and in the valleys, but also fleshy seeds of indigenous trees, most of which latter are just as susceptible or adaptable to the pest as is the kamani and coffee berry of the lower lands, two of the most infected fruits growing in the Territory. However, as before stated, results as to artificial methods of control in any one region will be in proportion to the amount continuously appropriated for the work, provided that the latter is conducted under the well accepted methods of other countries and that unity and cooperation is at all possible.

The only hope I have, as has been repeatedly stated in previous reports, is in the discovery of a specific parasite. To find, introduce and successfully establish such a parasite would be worth the best part of any one large appropriation which either this Territory or Congress would set aside for clean culture methods. With the successful establishment of such a beneficial insect, nature's methods would accomplish much more in a general way of perfect control than we can ever expect by the usual artificial methods, more particularly if both of these were combined in a systematic and scientific manner. To this end every effort should be made to push the entomological research work in suitable tropical countries where this particular species of fruit fly is known to have its habitat in exceedingly small numbers. Such work, to be successful from a scientific and economic standpoint, should only be undertaken by entomologists of the highest order and who have had previous experience in successful work of a similar nature. In Dr. Silvestri, who is already preparing for the field, we have one of these men, and the very best authorities indicate tropical West Africa (where he is going) as the most suitable place to explore for a parasite of the Mediterranean fruit fly. If later on funds are available, I believe it would be money well spent to assist this research work by the addition of another equally good economic entomologist and have him sent to another section of Africa where the fruit fly is not known to be a pest but exists only in small numbers. It is quite possible that in such a locality the fly is being controlled by either a parasite or predaceous enemy, either of which might be found to some extent suitable to our requirements. Of course, such parasitic research work (particularly that of the Mediterranean fruit fly) is altogether problematical as to results, but the Territory has already succeeded on similar lines under private organization, and there is no reason why, under government auspices and with sufficient funds, a proportionate amount of success should not be obtained. In any case it would be settled once and for all whether future search for such a parasite was to be negative in results. The success of such work to a very great extent depends on the selection of the entomologist, not only for the field work, but also as to those who handle the material after it arrives safely at its destination. For obvious

reasons only the most experienced of men in this class of work should be allowed to handle such material.

Since my last report I have received a communication from the Chief of the Bureau of Entomology at Washington, D. C., in which he informs me that the congressional appropriation to assist the Territory in the fruit fly campaign has passed both houses and would eventually find its way to the President for signature. If signed, the appropriation will become available on July 1, and will, of course, be expended under the direction of the federal bureau. The Chief Entomologist, Dr. L. O. Howard, in asking for coöperation and advice, states that he has engaged a Dr. Back to direct the expenditure, and that the gentleman would in all probability be in Honolulu early in July. After the arrival of Dr. Back, the board will coöperate with the federal department in extending the work which will no doubt be possible with the larger sum available. It goes without saying that Dr. Back will also have to undertake work of control on the other islands, which our small local appropriation has not made possible. As you already know, the insular inspection and control has been in the hands of district committees appointed by the island commercial organizations. The board, however, has kept in communication with the chairmen of these committees, has issued commissions to such inspectors as the latter have appointed, and it has furthermore arranged with the Territorial administration to apportion the two larger islands a small sum to assist the various districts in the exclusion of the pest. Unfortunately, the fruit fly has since been discovered in almost every district on both islands, and it will not be long before the infestation will be general owing to the uninterrupted large areas of guava and wild fruits which prevail along the upper slopes.

In view of changed conditions as to prevalence of fruit fly on the other islands, there may perhaps be necessity for a slight modification in the Territorial regulations as now in force. I do not think, however, that any change should be made until we have received an expression of opinion from the district and commercial organizations on each island.

The alleged complaints because of a failure to export fruits and vegetables from any of the other islands to Oahu were based on a wrong interpretation of existing regulations by officials over whom this board had no control. There have never been any legal restrictions as to the importation of such supplies on Oahu since the fruit fly was first discovered here. The misunderstanding was easily and satisfactorily settled as soon as investigated.

In addition to the usual inspection, gathering and destruction of fruit, which has been maintained during the month, there has also been considerable spraying of large sections of fruit gardens in and about Honolulu. Experimental trapping for adult fruit flies under the Australian method (kerosene

and other solutions) has also continued. Much more of this latter work, as well as spraying, will no doubt be possible as soon as the congressional appropriation is available after Dr. Back's arrival. The spraying solution used is the well-known Cape Colony (Mally) formula, viz., proportions of arsenate of lead, molasses and water. Our small appropriation, which had to last for over a year, or until the next legislature convened, has not made it possible to spray beyond the experimental stage, although during May much has been done by a special gang on these lines. I have refrained from this method in the large colonies of honey bees, as it is quite possible that the solution may poison the workers in more or less numbers. As the honey business in the Territory has increased to large proportions of late years and is in fact equal, if not greater, than any commercial interests in fruits other than pines, I am inclined to disfavor spraying with poisoned solutions in sections where hives are kept on a commercial scale. When Dr. Back arrives I shall present this feature to him most forcibly and, if possible, prevail upon him to restrict spraying, as I am doing now, to such areas as are not frequented by large numbers of bees seeking food.

I have also to report that as a result of laboratory work the fruit fly has been bred naturally out of fleshy seeds of the sugar palm (*Arenga saccharifera*) and the fruits of the elengi tree (*Mimusops elengi*). The foregoing list may be added to the already extensive breeding results from our laboratory.

As there is a possibility that the labor gangs of the Sanitary "Clean-Up Day" Committee may mix quantities of fruit with other garbage on June 20 (Clean-Up Day), I shall communicate with the above organization and request its cooperation in order that the fruit gathered may be sent immediately to the incinerator and not left indefinitely on sidewalks or dumps. I intend further to show that the board has a desire to cooperate in the general clean-up of the day by loaning them our full staff of inspectors.

Mr. Weinland, the representative of the California Horticultural Commission, has during May increased his staff of inspectors of fruits, etc., intended for shipment to the coast. This has proportionately reduced our own gang for the time being. I shall immediately bring up our own staff to such proportions as the monthly apportionment of both the California and Territorial appropriations will permit.

During May I made a short visit of inspection at Hilo, Kau and Kona. In the latter district I stayed the best part of a week investigating fruit fly conditions in coffee. As the pest distributed itself throughout the district in a very short time after its first discovery, the planters were somewhat alarmed as to what might be the result to their coffee and other crops. I found the district well organized as to a "Control Committee" and the members of

the district club appeared alive to the fact that they would have to take preventive means to stop an overproduction of the fly. Owing to the nature of the ground, which is mostly disintegrated "aa," it is hardly possible to do any systematic clean culture work, but there is no reason why the spraying and trapping method should not be carried out with some success, if properly attended to. Kona's coffee is grown in fairly large and uninterrupted areas, and therefore the spraying could be done by each small planter and by others interested on a commercial scale and with less difficulty than in other sections on the islands.

Futhermore, the berries are in most instances pulped at central mills and the pulp pile can be treated with lime or acid and an enormous percentage of maggots destroyed. It has not been demonstrated to what extent the coffee berry or the bean is damaged by the maggot. Apparently it does no particular harm, but it would be rash to finally conclude that such is the case. The question involves a series of experiments by both chemist and plant pathologist. During this visit I was accompanied by Mr. D. Fullaway of the U. S. Experiment Station, and both of us had several conferences with the Kona Control Committee, looking to the further organization of artificial methods of control to suit conditions in that district.

I am indebted to Dr. Wilcox and Mr. Fullaway, both of the U. S. Experiment Station, for official courtesies and coöperation rendered in the control work during the past month. The office also extends its thanks to Mr. G. Wilder for samples of infested fruits used for laboratory purposes.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruit Fly Control, T. H.

DIVISION OF FORESTRY.

Honolulu, Hawaii, June 8, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu,
Territory of Hawaii.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of May, 1912:

During the first half of May, I was in Honolulu engaged in part in the preparation of reports and statements desired by the board, including an estimate of expense for the fiscal year July 1, 1912-June 30, 1913.

On May 9, at the request of the trustees of the Bishop Estate, I visited lands belonging to them at Kaneohe, Oahu, subsequently submitting a brief report recommending a forest boundary and outlining a program of tree planting for a portion of the tract.

Trip to Hawaii.

From May 17 to 31, I was on the Island of Hawaii, engaged on a general inspection trip that included an examination of the condition of the forest in the Kau Forest Reserve, a visit to the Hilo Nursery in charge of Bro. Matthias Newell, where about 10,000 seedling trees of various kinds were seen, awaiting distribution, an inspection of the tree planting now in progress on waste lands of the Hawaiian Agricultural Company's sugar plantation at Pahala, and a careful checking up and inspection of the forest planting that has been going on, under contract, on the government reserve of Puukapu, above Waimea village. Incidentally, I saw a good many people along the way who had interests in one and another forest matters.

The tree planting at Pahala is especially to be commended as being just the sort of work which this division has been persistently advocating for a number of years—the utilization of gulch sides and other waste areas not adapted for sugar cane, by the planting of trees useful for fuel or wood. *Eucalyptus robusta* and *E. Globulus* are the trees that have mostly been planted. Along some of the roads and about the newer laborers' camps lines or shelter belts of these and other trees have been set out. The work is receiving not a little of the personal attention of Mr. W. G. Ogg, manager of the Pahala Plantation, who has become an enthusiastic tree planter.

The tree planting at Waimea is being done under a contract entered into last year between this department and Mr. A. W. Carter. Some forty odd acres of *Eucalyptus robusta* have been set out. The trees are spaced six feet apart, 1210 to the acre. The stand is in excellent condition, only a very small percentage of the seedlings set out having died. Under the contract, Mr. Carter furnished the seedlings from the Parker Ranch Nursery at Waimea. This forest plantation is now being extended by him on the fee simple land of Waikoloa, owned by the ranch. In all there will be planted a considerable block of forest.

Work at the Government Nursery.

The routine report of the Forest Nurseryman, transmitted herewith, gives the details of the work carried on at the Government Nursery and the Makiki Station during the month.

New Circular.

During the month a new circular of the Division of Forestry has been issued, No. 2, entitled "Instructions for Propagating Forest, Shade and Ornamental Trees," by David Haughs, Forest Nurseryman. This circular is a revision and enlargement of an earlier press-bulletin. It contains practical directions about va-

rious sorts of tree planting. Copies may be had free upon request.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

R. S. Hosmer, Esq., Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—The following report gives the principal work done during the month of May:

NURSERY.

Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot-grown. | Total. |
|--------------|-------------------|---------------------------|------------|------------|
| | 1000 | 3110 | 3071 | 7181 |
| Sold | 700 | 250 | 854 | 1804 |
| Gratis | <hr/> 1700 | <hr/> 3360 | <hr/> 3925 | <hr/> 8985 |

Included in the gratis number is 1000 transplants of *Casuarina quadrivalvis* sent to Pupukea Water Reserve; 1000 assorted transplants, and 1625 pot-grown trees to Mr. Owen in payment of part of planting contract; 800 transplants and 687 pot-grown *Cryptomeria japonica* were sent to South Kona Ranch Co.

Collections.

| | |
|---|---------------|
| Collection on account of plants sold amounted to..... | \$10.20 |
| From Division of Animal Industry for manure sold.... | 18.00 |
| | <hr/> \$28.20 |

Plantation Companies and Other Corporations.

From the stock raised with labor supplied by plantation companies and other corporations, we have received orders and supplied the following plants:

| | In seed boxes. | In boxes transplanted. | Pot-grown. | Total. |
|------|-------------------|---------------------------|------------|--------|
| | | 1900 | 750 | 2650 |

Collecting Seed.

The two seed boys have been collecting Eucalyptus seed on Tantalus and assorted seed around the city.

Experiment Garden, Makiki.

The two men employed at the garden have been busy transplanting and doing other routine work. The stock raised for the use of plantation companies and other corporations will have to be looked after by the regular men after the end of June, as the fund coming from that source will, by that time, be entirely exhausted.

U. S. Experimental Planting, Nuuanu Valley.

The man has been hoeing and clearing away grass from the trees. More planting will be done as soon as the weather is suitable, the ground being too dry at present for tree planting.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

 DIVISION OF ANIMAL INDUSTRY.

Honolulu, Hawaii, May 31, 1912.

Hon. W. M. Giffard, President and Executive Officer, and the Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of May, as follows:

The month of May was characterized by an unusually heavy influx of dogs, no less than thirty-six animals arriving during this period. With the quarantine station already full to overloading, it became necessary to take measures to dispose of these dogs, as it was found impossible to construct additional premises for the first bunch of sixteen animals which arrived on the transport Sherman on May 18th.

Under date of May 7th an application had been received from the chief veterinarian of the 5th U. S. Cavalry, for the establishment of a sub-quarantine station for military dogs at Schofield Barracks. With the arrival of the Sherman it became necessary for this board to take action on the application without delay, and when a delegation of officers, headed by Col. McGunagle, of the 1st U. S. Infantry, called on the acting chairman of the committee on animal industry, it was decided to allow the military dogs to be quarantined under the immediate supervision of the military veterinarians, and steps were taken without further delay for the construction of kennels and enclosures for the accommodation of the sixteen dogs at Schofield Barracks. The colonel, as well as the other officers, gave their personal guarantee that the quarantine would be rigidly enforced and especially that owners would not be allowed to handle or to care for their dogs in person, but that regular keepers would be appointed to act

under the supervision of the military veterinarians. Under these circumstances it was decided to detain the dogs on board the transport while the kennels were being constructed and that the animals should be shipped by train as soon as the kennels had been inspected and approved of by the Territorial Veterinarian. On the following day, therefore, I went to Schofield Barracks, where the frames for the kennels had been put up, but as the wire had not arrived it became necessary to quarantine the dogs, who by mistake had been sent out the same day, in box stalls. On the trip down one of the dogs was lost by jumping out of a window while the train was moving at full speed, and even though the train was stopped and backed up, the dog was not recovered. I have since been assured that this dog, a greyhound, returned to Honolulu and was placed on board of the transport and taken to Manila. This incident, however, shows the danger of shipping dogs to Schofield Barracks unless better precautions are taken to prevent their escaping. This, I have been assured, will be done in the future, and from observations made on a number of subsequent visits of inspections, I believe that the military authorities will carry out the quarantine regulations as stringently as is being done at the board's station in Honolulu.

On the 21st of May the steamship Makura arrived from Sydney with fourteen dogs belonging to a theatrical company known as Lordy's Dog Show. Here again it was found impossible to accommodate so large a number of animals at our station on the Beach road, and as the company was very anxious to give a number of performances here before proceeding to the mainland, application was again made for the establishment of a sub-quarantine station within the confines of the Bijou Theatre. The committee on animal industry submitted the question of the board's authority to take such a step to the Attorney-General, who was of the opinion that it was well within the scope of the board's authority to do so if sufficient guaranty of the enforcement of strict segregation could be obtained. The fact that these animals came from Australia, where rabies is supposed not to exist, operated in favor of granting the application, and when, upon investigation, it was found that two small rooms in the back of the Bijou Theatre were available for the segregation of the dogs it was decided that the animals should be allowed to be quarantined there on the condition that they be kept under constant surveillance of two specially appointed policemen, one of whom was to have charge of the dogs at all times, both day and night. The theatrical company also agreed to put up a bond for the purpose of guaranteeing the payment of all expenses in connection with the quarantining of their dogs.

In the meantime other steamers had arrived, and as practically every boat brought one or more animals, it became necessary for the board to take action on my application for the enlargement of the quarantine station on the Beach road. Under date of May 22, authorization was granted this division to construct

six additional enclosures and twelve kennels, each enclosure to contain two kennels, it being suggested that concrete work be dispensed with and that the kennels instead be elevated some distance above the ground. Authorization was also granted for the furnishing and equipment of the keeper's cottage and for the purchase of burlap awnings to protect the dogs against the heat of the sun. No special amount of money was stipulated for this purpose save that no expenditures should be made other than were absolutely required. As will be seen from the itemized statement herewith appended, the additional cost of enlarging the station has amounted to \$400 up to May 31, and it is estimated that about \$150 will be required to finish the work.

As stated in my last report, the keeper of the quarantine station, Mr. Davenport, resigned at the end of last month, and considerable difficulty was experienced in finding a suitable man to take charge of the place. On May 12 I succeeded in getting another man, Mr. Nathan Haskins, who at that time was at work on the construction of the drydock at Pearl Harbor. Mr. Haskins was very highly recommended as being sober, industrious and reliable, and while I had no authority to offer him more than \$45 per month, he agreed to go to work until the board could decide on more suitable wages for him. I would therefore recommend that he be paid \$65 per month, together with lodging, fuel and feed for one horse, with the understanding that he must live at the quarantine station and give his entire time to the care of the animals and to the maintenance of the station insofar as he is able to do so. It is, however, in my opinion, very doubtful whether one man will be able to attend to the constantly increasing amount of work if the same continues at the same rate as it has done since Mr. Haskins took charge. The care of the dogs alone practically requires his entire time, and when at the same time a number of horses and mules have got to be attended to and the premises and enclosures kept in a clean condition, it seems to be really more than one man can do without working night as well as day. I must, however, say that I have been absolutely satisfied with Mr. Haskins' work during the past month, and I trust that the board will see its way clear to insure retaining him by providing satisfactory wages.

In my report of last month it was recommended that steps be taken to have the proper authorities enforce the dog license act, and that the same be requested to impound and destroy as many stray and ownerless dogs infesting the streets of Honolulu as would be possible. As no definite action was taken by the board on this suggestion, I took the matter up with the sheriff, who immediately promised his coöperation and issued instructions for the dog catchers to begin work without delay. In the meantime I had obtained from San Francisco's Society for the Prevention of Cruelty to Animals plans and specifications for a so-called "lethal chamber"—that is, an air-tight box in which the dog to be destroyed is enclosed and asphyxiated by means of ordinary

illuminating gas. Such a chamber has now been constructed within the yard of the county jail, and the capture of unlicensed dogs has been going on for some time. I expect to be able to report on the effectiveness of this new method for destroying dogs at the meeting of the board on June 10, as the first bunch of dogs will be destroyed before that time.

In order to maintain reliable data in regard to the prevalence of rabies in California, a communication was sent to the federal inspector in charge at San Francisco with a request for all information at his disposal pertaining to this subject. His reply has come to hand and is herewith submitted for perusal by the members of the board. From this correspondence it will be seen that the measures taken by the board for the purpose of protecting the Territory against the introduction of rabies are more than justified by the facts contained in this official communication. Not less than nine human lives have been sacrificed during the present outbreak of rabies in California, and it is estimated by the director of the State Hygienic Laboratory at Berkeley, California, that not less than 3200 cases of rabies among dogs and other animals have occurred within the State during the past two years. To this he adds that the disease is rapidly spreading, and in my opinion there can be no doubt that unless the present regulations are effectively enforced it would be a very simple matter for the disease to gain entrance here. In fact, I have been informed that a dog that passed through here on one of the steamers for the Orient developed rabies before the steamer reached Yokohama and bit his owner. If this dog had been destined for this port we would have had the disease here, and it can only be hoped that the same would have been recognized in time to prevent the infection of the keeper, or the spread of the disease to other animals. From a communication signed by the State Veterinarian it is learned that not less than eight laboratories for the administration of the Pasteur treatment to persons who have been bitten by rabid dogs have been established in various cities of California, among which may be mentioned Berkeley, Los Angeles, Fresno, San Francisco and Sacramento. In case, therefore, the disease should gain entrance here, bitten persons would be removed only from six to twelve days from treatment, dependent upon the departure of steamers. But as one of the human cases of hydrophobia mentioned in the appended correspondence developed the disease in fifteen days after having been bitten, and before the Pasteur treatment was little more than half finished, it will be seen that we are not any too well protected in case the disease should get in here, and it is suggested that the attention of the local Board of Health be called to the advisability of being prepared to administer the Pasteur treatment in case it should become necessary.

An application has been received from Mr. Lordy, the owner of the performing dogs now quarantined at the Bijou Theatre, for permission to perform at Wailuku, Maui, and at Hilo, Hawaii.

In case the board considers it advisable to grant this request I would suggest that it be stipulated that the same two policemen who are now in charge of the dogs here must accompany the troupe and remain in charge of the animals at all times, the same as is now the case. The manager has suggested that in order to save traveling expenses and hotel bills, it might be possible to obtain local police officers at the places visited for the purpose, but I am very much in doubt whether the same would be as effective as a continuation of the men in charge who have become familiar with the requirements of the position. I am further of the opinion that the granting of such a permit would give rise to a great deal of criticism, and it will establish a precedent which may cause inconvenience at future times when similar requests may be made.

The report of the Assistant Territorial Veterinarian on the routine work of the division for the month of May is herewith submitted for the consideration of the board.

Very respectfully,

VICTOR A. NORGAAED,
Territorial Veterinarian.

REPORT OF ASSISTANT TERRITORIAL VETERINARIAN.

Honolulu, Hawaii, May 31, 1912.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I have the honor to submit herewith a report for the month of May.

Tuberculosis Control.

The work in this line has been confined to testing several lots at different points on this island, and is as follows:

| | T. | P. | C. |
|----------------------------------|-----|----|----|
| May 1—Kaneohe Ranch | 102 | 94 | 8 |
| May 3—Waimanalo Plantation | 28 | 28 | 0 |

*The number tested at Kaneohe Ranch represents merely what were at that time in the milking corral and a few of the bulls of the main herd which they were able to round up. The final test will be made when they make their drive some time next month.

No test of the entire herd has ever been made on this ranch, last year's test only taking in 100 head, out of which four cows were condemned. This year's test consisted of a re-test of practically the same animals, with the addition of the breeding bulls above mentioned, out of which number eight were condemned, two cows and six bulls.

These condemned animals had all received the test for the first time, a fact which would seem to indicate that considerable disease exists among the main herd. It is a rule, almost without exception, that where the disease exists in a herd, the bulls give evidence of being infected and the disease is, perhaps, more rapidly and surely disseminated through them than through any other means. The results of the test of the main herd will be awaited with interest.

The test at Waimanalo Plantation contains no points of interest. The animals tested were the same as were tested last year, the record being clean for each year.

There is still considerable work remaining before this test is completed, and will be started as soon as weather conditions are such that the animals can be kept up the necessary length of time, which means that there must be a rainfall to put the pastures in condition. A rough estimate puts the number still to be tested at two thousand.

Inspection and Importation of Livestock.

Pursuant to a request from Hind, Rolph & Co. for inspection of stock landed at Honoipu and by order of the Board of Commissioners, I left for Mahukona on the Mauna Kea, May 21. Upon my arrival I proceeded directly to Kohala, and the following day set out to inspect the one stallion, two boars and one Merino ram which had been landed there. The stallion was the only animal of the shipment still confined, as permission for the release of the others had been obtained from the board a week previous. I was able to examine the stallion and the two boars, which were found to be apparently free from any contagious or infectious disease, and were admitted into the Territory. I returned on the Mauna Kea, May 25.

List of Importations.

- May 6—S. S. Siberia (Orient), 1 ct. Jap. games.
- May 8—S. S. Lurline (San Francisco), 1 horse, S. W. Hansen; 2 horses, C. M. Apple; 1 Jersey heifer, W. E. Wall; 12 cts. poultry.
- May 14—S. S. Wilhelmina (San Francisco), 14 cts. poultry.
- May 16—S. S. Korea (San Francisco), 3 horses, 2 cows, 3 dogs, 2 cats, 4 cts. poultry, Mrs. A. Dias.
- May 17—S. S. Sierra (San Francisco), 16 cts. poultry.
- May 18—U. S. A. T. Sherman (San Francisco), 16 dogs—quarantined on reservation at Schofield Barracks.
- May 21—S. S. Manchuria (San Francisco), 2 dogs, F. Baldwin—quarantined at station.
- May 21—S. S. Makura (Sydney), 14 dogs, Lordy Company—quarantined at Bijou Theatre.

- May 22—S. S. Honolulan (San Francisco), 8 horses and 2 mules, E. A. Eames; 1 horse, H. G. Smith; 1 stallion (white three-quarter Arab), D. P. R. Isenberg; 1 ct. rats—quarantined at station.
- May 27—S. S. Chiyo Maru (Orient), 4 cts. poultry.
- May 31—S. S. Siberia (San Francisco), 1 dog (Skye Terrier), Mrs. F. Martin—quarantined at station.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Hawaii, May 31, 1912.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of May, as follows:

During this month there arrived 35 vessels, of which 20 carried vegetable matter, two carried building sand, and one carried ballast. The usual careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 541 | 8709 |
| Fumigated | 30 | 166 |
| Burned | 13 | 165 |
| Total inspected | 584 | 9040 |

Rice Shipments.

Rice to the amount of 20760 bags arrived from Japan during the month of May and was passed, after careful examination, as clean and free from pests. Notice has also been given to the several importers of rice to notify their agents in Japan regarding the fumigation of rice at the ports of Japan and not to have any weevily rice shipped here in the future.

Sugar Cane.

On May 11 the American-Hawaiian S. S. Company's steamer Columbian brought a large case of sugar cane and 15 cases of soil from Salina Cruz. This was consigned to Theo. H. Davies & Co., of Honolulu. We were unable to locate the shipment and received the report that it was a short shipment and would probably arrive on the next vessel. However, it seems that the ship-

ment was on the vessel and was taken to Kahului, Maui, and unloaded there and then brought back to Honolulu by the Claudine. We were notified about the shipment through the customhouse, and after entry was made we took possession of the shipment. The agents were notified and told of the law regarding soil and sugar cane, and we then hauled the 16 boxes to the incinerator and remained there until the last of them was burned. We understand that this shipment was sent here for analysis, and that the H. S. P. A. Experiment Station were to be asked to perform the work. I believe that should such be the case it would have been a very dangerous undertaking on account of the possibility of introducing some disease into the station grounds, where material for every plantation in these islands is propagated. However, as the matter now stands, the danger has been removed by the destruction of the sugar cane as well as the soil.

Pests Intercepted.

Fifty-one packages of vegetables and 47 packages of fruit were confiscated from passengers and immigrants during the month, much of which was infested with pests as well as prohibited by law. In the soil around the roots of plants from Japan we found three large larvae of a *Melolontha species*, as well as a colony of ants. On another shipment of plants from Japan we found the following scale insects: *Pseudococcus azaleae*, *Pseudoaonidia duplex*, *Lepidosaphes curiae*, *Parlatoria pergandei* and *Parlatoria proteus*. Some rice owned by a Filipino we found infested with *Tribolium ferrugineum*, a cosmopolitan pest. From beans and acorns in the baggage of the Harpalion immigrants we found the pea weevil *Bruchus pisorum* and a *Curculionid*.

Hilo Inspection.

Brother M. Newell reports the arrival of seven vessels, four of which carried vegetable matter consisting of 84 lots and 1508 packages. One lot of palms was fumigated on account of scale insects.

Inter-Island Inspection.

During the month of May 64 steamers were attended to and the following shipments were passed on:

447 bags taro
 10 bags of taro tops
 2 bags cocoanuts
 1 box sugar cane
 95 boxes plants

Total 555 packages inspected and passed.

The following packages were refused shipment:

| | |
|-----|-----------------------------|
| 183 | packages of various fruits |
| 20 | packages of vegetables |
| 4 | packages of plants |
| 2 | packages of green awa roots |

Total 209 packages inspected and refused shipment.

I beg to report that Mr. Arthur E. Carter, inspector of inter-island inspection, tendered me his resignation on May 21. I have temporarily appointed Mr. Robert K. Kanakanui as assistant inspector for the work, pending further arrangements to be made regarding inter-island inspection after the end of June.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

REVIEW OF CURRENT LITERATURE.

The Hawaiian Annual, for 1912, contains a number of articles pertaining to agricultural matters. "A Synopsis of the Hawaiian Flora," by J. F. Rock, occupies 10 pages, with 5 illustrations. This article deals mainly with the geographic distribution of the native plants of Hawaii; and the affinities of the Hawaiian flora with those of adjacent regions. "The Present Status of Cotton in Hawaii," by E. V. Wilcox, covers five pages, and gives special attention to local soil conditions, protection of cotton from wind, and selection of varieties. Caravonica and Sea Island are compared, to the favor of the former. Directions are given for the control of the cotton-boll worm. "An Entomological Potomac," by D. L. Mackaye, fills nine pages, and summarizes in a popular manner the various lines of entomological investigation and enterprise that are carried on in this Territory. "The Future of the Rice Industry," by F. G. Krauss, is a succinct forecast, based upon prolonged and accurate observations, both in Hawaii and Japan. Prof. Krauss predicts increased production of Japanese varieties, to suit the demands of our steadily increasing Japanese population. "Volcanic Observances at Kilauea Inaugurated," is the title of a 12-page article in which Mr. F. A. Perrett's valuable weekly reports to the Advertiser have been collaborated and reprinted. *Fruits of the Hawaiian Islands*, by Gerrit P. Wilder. Hawaiian

Gazette Co. 1911. 247 pp. 122 plates. 10½ x 7¼ inches.

This convenient handbook, the work of one of Hawaii's leading amateur horticulturalists, is very satisfactory from a book-man's

standpoint. It is well-printed on a heavy glazed paper that brings out to advantage the half-tone plates. The plates are the leading feature of the book, and in general are large size and satisfactory in finish. Facing each plate are brief descriptive and cultural notes. One wishes that these notes were more detailed and complete, especially as regards methods of propagation. In this particular phase of tropical pomology Mr. Wilder's unusually wide and varied experience might have been more generously shared with a public that knows very little of the technique of plant propagation. The following genera are treated with special fullness: *Jambosa*, *Eugenia*, *Citrus*, *Artocarpus*, *Annona*, *Psidium*, *Passiflora*, *Persea*, *Ficus*, *Chrysophyllum*, *Carica*, *Mangifera*, *Solanum*. In all about seventy genera are discussed. In many of the plates structural details of the flowers and fruits are shown. Notwithstanding the brevity of the text, this book is a welcome addition to the scant literature pertaining to Hawaii's horticulture.

The Influence of Molasses on Soil Fertility, in *Agricultural News*, Barbados, Vol. 9, 1910, No. 222, and Vol. 10, 1911, No. 238.

These articles briefly summarize the results of experiments in Mauritius, Antigua, and Hawaii, with molasses as fertilizer for sugar cane, indicating "that the application of molasses to fallow land, or to land in which sugar cane is to be planted after several weeks have elapsed, may have a beneficial effect in stimulating the action of the nitrogen-fixing organisms and thus adding to the store of nitrogen for the crop that will be growing after such a time has elapsed as will have allowed this stimulus to have had its proper effect." In the Antigua experiments the application of 400 gallons of molasses per acre increased the yield of cane 1.2 tons per acre.

Experimental Tappings With Rubber, by T. B. McClelland, Report of the Porto Rico Agric. Expt. Station for 1910, pp. 39, 40; 1 plate.

This reports results of experimental tappings of 7- and 8-year-old Castilla trees, on station grounds, using herring-bone system. Since the cuts heal over very slowly, the herring-bone system is not considered suitable for Castilla. The relative amounts of dry rubber bore no relation to the quantity of latex per tree.

An Important Humana Disease, by S. K. Basu, in *Quarterly Journal of Bengal Dept. Agricult.*, Vol. 4, 1911, No. 4.

This fungus disease is said to be increasing to an alarming extent in certain parts of India. The main symptoms are: 1, the yellowing of the older leaves; 2, the formation of one or more much reduced leaves at the crown; 3, the gradual withering of the younger leaves, the final breaking down and death of the plant, which often occurs within 10 or 15 days from the first appearance of the disease. The fungus has not been determined. Clean culture methods are recommended.

The Report of the Entomologist, W. V. Tower, in the 1910 report of the Porto Rico Agric. Expt. Station, contains notes on the guava fruit-fly; an ant which is a source of serious injury to coffee; citrus pests; bees and bee-keeping; and the sugar-cane insects of Cuba.

Citrus Fruit Insects, by H. J. Quayle, in Calif. Agric. Expt. Station Bulletin 214, is a summarized account of the more important insect enemies of citrus fruits, their natural enemies, and means of control. Methods of fumigation are briefly described, and the text given of the section of the state law on orchard and nursery inspection.

Another California paper, (Cal. State Commissioner of Horticulture, Circular, 1911, pp. 3-7), calls attention to the danger of introducing the Morelos orange maggot from Mexico, and the melon-fly and the Mediterranean fruit-fly from the Hawaiian Islands, into California.

Ripe and Unripe Bananas, by R. Reich, in Ztschr. Untersuch. Nahr. u. Genussmtl., Vol. 22, No. 4.

In this article, according to a recent Experiment Station Record, "analyses are reported of dried ripe bananas of different sorts, unripe bananas, banana flour, skins from ripe and unripe bananas, and fresh bananas of different sorts. The conclusion is reached that in the case of bananas which are shipped green and then allowed to ripen, the transformation of starch into sugar takes place normally. The inversion of saccharose, however, proceeds slowly under such conditions. It appears further that bananas in which the saccharose content is higher than the invert sugar are to be regarded as 'unripe.' The flavor is flat, and there is little or no aroma."

Breeding and Feeding Sheep, by J. W. Wilson, South Dakota Agric. Expt. Station, Bul. 127.

This bulletin reports the results of six years work, the object of which was to ascertain which of six breeds of sheep, Caswell, Hampshire, Oxford, Southdown, Shropshire, or Rambouillet, is the best to use on the western-bred ewe, both wool and mutton being considered.

Poultry House Construction and Yarding, by H. L. Kempster, Michigan Agric. Exp. Sta. Bulletin No. 266.

This illustrated bulletin deals with the general principles of poultry house construction.

Practical Poultry Buildings, by H. L. Blanchard, Washington Agric. Exp. Sta., Bulletin No. 4. Special series, revised.

This bulletin is another recent and well illustrated summary of methods and appliances.

Poultry House Construction, by J. G. Halpin and C. A. Oscock, Wisconsin Agric. Exp. Sta., Bulletin No. 215.

In this pamphlet the colony and long house systems are described, and bills of material for different houses are given.

Milk Standards. A study of the Bacterial Count and the Dairy Score Card in City Milk Inspection by W. K. Brainerd and W. L. Mallory. Virginia Agric. Exp. Sta. Bulletin No. 194.

This bulletin discusses the use of the dairy score-card in regulating the sanitary condition of city milk, and reports results of studies to determine the relation between the bacterial content of milk and its rating as measured by the score card, and the value of the bacterial count as a supplement to the score card in city milk inspection.

Relation of Calcareous Soils to Pineapple.

Chlorosis, by P. L. Gile. Porto Rico Agric. Exp. Sta. Bulletin 11.
A chemical study of chlorotic soils and plants.

MECHANICAL RUBBER TAPPERS AND GATHERERS.

The late J. B. Carruthers when at the head of the Botanical Gardens in Trinidad, expressed himself as doubtful of the possibility of planters of *Hevea* anywhere in the Americas competing with those in the Far East. He acknowledged that everything in the way of climate, soil and moisture was ideal in the Guianas, for example, but the labor cost seemed to him an insurmountable obstacle. That is to say, 15 cents a day as against 40 cents for a coolie was enough to make a marvelously profitable business in Malaya unprofitable in Guiana. Were Para rubber to drop to 50 cents a pound and stay there, it doubtless would cause those who are considering planting in the Americas to pause, but such an eventuality is hardly possible for years to come, at least. Plantation Para costs in the Far East, say, 25 cents a pound. In the Guianas it may cost 35 cents, perhaps 40 cents, but even at that it will be a marvelously profitable crop.

Then, again, it must be remembered that labor costs in the East are gradually going up. It is not improbable that with the enormous expansion in planting in Ceylon, the Federated Malay States, Java, Sumatra, Borneo, etc., labor will become scarcer and wage scales appreciate considerably. Then, too, there is the mechanical faculty of the American planter to be taken into account. It is by no means thinkable that the last word has been said upon methods of tapping, gathering and coagulating. With trees set in orderly rows equally distant one from another, who can say that it is impossible to operate mechanical tappers and gatherers that will do the work of hundreds of coolies? When the Yankee gets too far behind in the race for any sort of supremacy, he is likely to discover some short cut that lands him at the goal with the rest. He certainly is far behind in the pro-

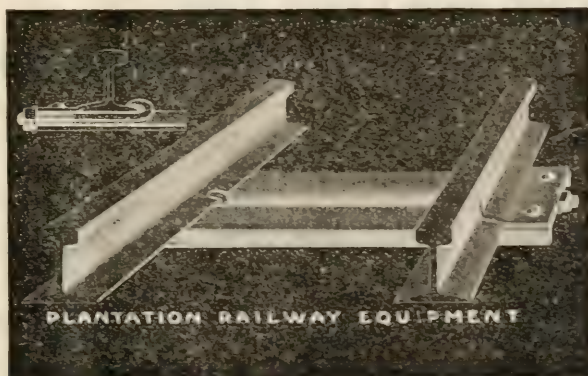
duction of systems of tapping and gathering now. Nearly all of the successful ones are of English origin, and are the result of much labor and experiment. To better them is to possess and utilize genuine mechanical genius.—*India Rubber World*.

PRICKLY PEAR FOR WHITEWASH.

The use of the sections of the stem—commonly called leaves—of prickly pear (*Opuntia* spp.) in making whitewash is frequently met with in the West Indies.

In regard to this matter, a note contained in *The Colonizer* for November, 1910, drawing attention to a similar employment of the prickly pear in Uruguay, is of some interest. It is stated that the white color of the farm buildings in that state serves for special attraction, even during the wet season.

The mode of employing the "leaves" is stated to be to slice them, macerate them in water for twenty-four hours, and then to add the lime and mix well. The endurance of whitewash thus made forms a matter for particular comment.



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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box , Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION --Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Iloohiawahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp. cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER *and* AGRICULTURIST

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JULY, 1912.

No. 7.

Recent bulletins of the Hawaii Agricultural Experiment Station are the following entitled: Sisal and the Utilization of Sisal Waste, by E. V. Wilcox and Wm. McGeorge; The Pineapple in Hawaii, by J. E. Higgins; Index to Publications, July 1, 1901, to December 31, 1911, by A. T. Longley.

Mr. David Smith, a fruit and banana merchant of Flinder's Lane, Melbourne, writing on the 30th ultimo, on the banana trade, points out that there is always a good market awaiting Fiji bananas in Melbourne. At present they are practically relying on Queensland for supplies, "and the stuff they are shipping is not worth classing as bananas, being small and very discolored in appearance; however, we have to make the best of them."—Western Pacific Herald.

The foregoing may contain a suggestion for Hawaii to act upon when the Panama canal has been opened.

The Tropical Agriculturist (Ceylon) for May copies from the FORESTER for January the article by E. M. Ehrhorn, Territorial entomologist, "Clean Cultural Practice Method for Fighting Insect Pests." The same magazine has reproduced in two numbers, concluding it in the May, T. H. Gibson's report on the "Course of Study for Elementary Schools," from the FORESTER.

According to Colonial Reports, the cultivation of limes continues to occupy the position of principal agricultural industry in Dominica, and further expansion has once again to be recorded. The crop for the year was 369,000 barrels, an increase of 85,000 barrels over the crop of 1909. This remarkable increase is partly attributable to the coming into bearing of young plantations established within recent years.

A HANDSOME FLOWERING PLANT.

The Agricultural News (West Indies) gives, from various authorities, an account of *Baikiaea insignis*, belonging to the family of pod-bearing plants (Leguminosae) and a specimen of which, it is said, may be seen in the Dominica Botanic Garden. It is

noted for the size of its flowers. The tree reaches a height of about 60 feet; it is provided with short pinnate leaves which bear very stiff, naked, large, elongated leaflets which are often alternate: there may be two or three pairs, or only one. The white flowers are in short racemes, and are among the largest and most splendid flowers of the Leguminosae. The thick calyx is provided with velvety hairs, and is more than 3 inches long; the petals are broadly oblanceolate or inverted egg-shaped spatulate, and reach the considerable length of over 6 inches.

The account goes on to say that this beautiful flowering tree was discovered originally in Fernando Po (in the Gulf of Guinea), and among much additional information, states that it has also been collected near Lolodorf (in Kamerun), where it was found as a bushy tree 36 to 60 feet high, with a brownish-grey bark, glassy, bright-green leaves, and a not very hard wood. A very similar plant to *B. insignis* is *B. minor*, which only differs in the possession of smaller flowers and more pairs of leaflets.

RABIES IN CANADA.

Rabies, precautions against which here some people hastily flouted at, would appear to be taking a world range this year. In a previous number the FORESTER told of its appearance in the Philippines and of the steps taken for its repression there. Dr. Norgaard in his last month's report gave information of cases, one at least fatal, in California. Now comes news of a fearful visitation in Canada, with some dire results, contained in the following press dispatch:

Goderich, Ont., June 20.—A serious outbreak of rabies has developed in Goderich township where cattle have been infected and died in great agony. Some two weeks ago a steer on the farm of Mrs. Joseph came home acting rather peculiarly as if affected with some form of paralysis. A local veterinarian was immediately summoned, but did not consider the trouble serious.

However, the affliction of two more of the cattle a day or so later gave fears that something was wrong. Government veterinaries from Toronto and Ottawa were summoned, who, on investigation, pronounced the disease to be rabies.

Some six cattle of the farm have since suffered most agonizing deaths. Two rushed to the lake and were killed as they hurled themselves over the bank.

Two sons and a daughter of Mrs. Salkeld, who had assisted in treating the cattle, have gone to Toronto for the Pasteur treatment. Farther east in the country, Reginald Sturdy, aged eighteen, was attacked by a dog, on Tuesday, and in attempting to fight it, received several bites, the flesh of one hand and arm being literally torn off. The dog escaped and several search parties have failed to locate it.

The board of health has issued a proclamation that all dogs must be chained up or muzzled for thirty days.

SAW GINS VERSUS ROLLER GINS FOR CARAVONICA COTTON.

By C. K. McCLELLAND, Federal Experiment Station, Honolulu.

There has been some uncertainty among the various producers of Caravonica Cotton in Hawaii as to the advisability of ginning the cotton upon saw gins thinking that the fibre might be injured by so doing. Roller gins of equal capacity as small saw gins cost several times as much. At the Experiment Station we have the smaller types of both the saw and roller gins, and the saw gin, which cost less than half as much as the roller gin, has a capacity of about five times as much lint per hour, representing a saving in the cost of the machine, of labor, of gasoline, and of wear and tear upon the engine and gin. In order to find out if the claim "that long staple cottons should be ginned upon roller gins" held true for Caravonica cotton, we submitted samples to the Wonolancet Company of Nashua, N. H., for test. They have reported as follows:

| | Saw-ginned cotton. | Roller-ginned cotton. |
|--------------------------|--------------------|-----------------------|
| Amount received | 261.4 lbs. | 414.12 lbs. |
| Picker room returned.... | 248.6 | 394.12 |
| Loss | 12.8 | 20. |
| Loss in per cent..... | 5.27 | 4.83 |
| Card room returned.... | 236.5 | 384. |
| Total loss | 24.87 | 30.12 |
| Total loss in per cent.. | 9.12 | 7.27 |

The comparison was carried no further, as the company claimed that practically all the broken fibres would be eliminated in these two steps.

The company say that the roller ginned cotton with a loss of 7.27 per cent. is about equal to Peruvian which loses 7.25 per cent. They also say that it is about equal to Peruvian in roughness, and consequently is of equal money value. They allowed us 18½ cents a pound for the roller-ginned cotton, that being the current price of Peruvian at that time; but on account of the greater loss in the saw-ginned cotton they allowed us but 18⅛ cents for it. The transportation amounted to about 1.45 cents per pound.

This report shows but very little difference between the two methods of ginning, but when the relative costs of ginning are considered, the difference will be found to be somewhat in favor of the saw-ginning. And, furthermore, the company submitted samples to the U. S. Department of Agriculture at Washington for strength tests, and after the final stage in the preparation of the cotton for yarn the breaking strength of the saw-ginned cotton was found to be 9.36 grammes as against 8.19 grammes for the roller-ginned.

The company offer the very likely reason for this difference by saying that probably the weaker fibres only have been broken by the saw gin, which when removed in the above processes leave the saw-ginned cotton with a higher average strength than has the roller-ginned.

It might be well to add here, however, that only in case the ginning is very carefully done upon the saw-gin is such a small difference likely to be shown. To do as little damage as possible to the cotton it is necessary that the gin be run at a lower rate of speed than the manufacturers have recommended since in their recommendation they were thinking of short staple cotton. The higher speed would give a greater capacity to the gin, but it might result in greater damage to the staple.

*PARASITES OF INSECTS ATTACKING SUGAR CANE.**

BY R. C. L. PERKINS.

In this Bulletin is described a number of very minute parasites, nearly all of which were bred from eggs of insects attacking cane in countries other than these islands.

The American species were obtained by Mr. Koebele, when investigating insects in the cane fields in Mexico, where he spent a short time during the winter months of 1908. All the rest were obtained by Mr. Muir in Fiji, China and the Malay islands. Many of these parasites are of great interest and importance, since they are important agents in limiting the numbers of injurious species which, if introduced into the islands without their parasites, would be likely to cause great loss to the sugar plantations. It has been advisable, therefore, to work out these insects and put them on record, so that in the event of any of the species which they attack turning up in the islands, information would be at hand as to where to look for natural enemies without delay. Although there is now a regular inspection of all imported plants and, without doubt, the vast majority of injurious insects is intercepted and destroyed, yet there are means of introduction which no inspection can provide against. Also there are some insects which are liable to be passed over by the most shrewd inspector and against which treatment by fumigation is ineffective. We know that in spite of the fact that there has been a systematic inspection of introduced plants for nine years, during the last few years numerous insects have appeared and become abundant. Because this is the case there is no reason to regard inspection as futile, for as has been said, there is no doubt that the majority of imported species is thereby prevented from becoming established. With the opening of the Panama canal and with quick

*Report of work of the Experiment Station of the Hawaiian Sugar Planters' Association. Introduction to Bulletin 10, Entomological Series. (Printed by permission U. S. P. A. Experiment Station.)

steamers from Central America we may safely predict that an entirely new lot of insects will be brought here, and that the duties of inspectors will become still more onerous. Many of these insects will be particularly dangerous, because we know that species from the warmer parts of the American continent readily become established and thrive here, whereas the native insects of California, though they have often been brought here, generally fail to establish themselves. This climate is evidently not suited to them. Although cane is no longer imported into the islands, yet many bad cane pests are by no means restricted to cane, but may easily be brought with other plants. It is well known that steamers have put in here from Fiji carrying cane on board, from which insects might easily have escaped to the shore, although such cane is not landed. It is also known that both on cane and on other plants, carried on deck, insect pests are frequently numerous. Mr. Muir has observed this to be the case with sugar cane carried on deck from Fiji, and Mr. Koebele and myself noticed great quantities of fruit fly maggots dropping from fruit carried on the deck of steamers, when we were traveling along the Australian coast. These fruit-fly maggots were crawling into cracks of the deck and pupating there, and some would certainly be likely to hatch out and gain the shore at other ports. Quick traveling steamers may carry even mature insects an enormous distance, so that they reach new countries by flight, when in or near port. Mosquitoes were still seen on board the ship on my last journey to San Francisco, five days after leaving Honolulu. On another journey numbers of a Chinese moth were seen about the decks the whole way to San Francisco. It would be very difficult and probably impracticable to keep such things from becoming established in a country suitable to them.

FREE LITERATURE ON PINEAPPLE CULTIVATION.

There is a great demand for pineapples in the world, and on account of the keeping qualities of the fruit the advantage in transportation is important. When cut at the proper time and carefully handled the fruit will reach the United States and European markets in good condition.

In our country the proper soil conditions for this cultivation can be found, and our proximity to the large American markets assure the cultivation of this aromatic fruit a profitable investment.

The General Department of Agriculture has recently published an excellent bulletin which treats on the "Cultivation of Pineapples in Porto Rico," written by the horticulturist of the agricultural experiment station on said island. This bulletin is for free distribution and can be had by addressing General Agricultural Department.—*Review of Tropical Agriculture* (Mexico).

*NOTES ON FOREST INSECTS.**

The Hawaiian forests are inhabited by a very large number of species of insects, most of which are so hidden and of such inconspicuous appearance that the forest region appears to be tenanted by very few kinds to people who have not paid particular attention to the habits of the creatures. Very few of the native insects do such damage as to be considered injurious, and at the present time very few imported species have caused any considerable destruction of forest trees. Consequently it may be said that the Hawaiian forests are probably more free from injurious insects than those of most, if not any, other parts of the world.

It is in many cases extremely difficult even for a trained entomologist to decide on the exact status of an insect found in connection with dead, dying or diseased timber. Such timber is always very attractive to many kinds of creatures, and the outsider observing these to be abundant, almost invariably attributes to them damage which has been brought about by quite different causes. Many of the insects supposed to be injurious in such cases are really highly beneficial, for they perforate and break up the dead wood, allowing water to penetrate to the heart of the timber and hasten decay, so that even a hard-wooded tree may be rapidly converted into humus. Further, in the case of old and diseased trees, the attacks of insects, that are partial to these, hasten the death of the tree and make room for younger and more healthy growth. There are, however, cases where, owing to various causes, a temporarily unhealthy condition of the forest is induced, and trees so affected are readily attacked by a number of species of insects. This may result in the actual death of trees, which, if unattacked, might fully recover. The commonest cases of this kind that we have observed in the islands are primarily due to the interference of man. For instance, such attacks commonly follow after a forest fire, trees slightly scorched often becoming badly affected by insects; forests where previously there has been a dense or uniform growth either of the trees themselves or of the undergrowth, and consequently a great retention of moisture, when opened up by cattle or by thinning and so rendered much drier, are very liable to attack, because many of the trees suffer from such change of conditions. That this is true is readily seen from the fact that in virgin forests, never entered by cattle, one never observes this great multiplication of individuals of species that attack the timber, and it is possible to search for days in such forests without finding a single individual of such species. It is a well known fact that the Hawaiian forests are singularly susceptible to any interference with the natural conditions—in fact, to an extent that is rarely, if ever, seen in the case of forests of other countries. This is perfectly natural, when we consider that they have developed under conditions very

* By Dr. R. C. L. Perkins. (Printed by permission of the Hawaiian Sugar Planters' Experiment Station.)

unlike most other forests, having been originally free from the effect produced directly or indirectly by the larger animals. Owing to the work originated for scientific purposes by a committee of English societies, aided by the trustees of the Bishop Museum, it is probable that the habits of the forest insects of these islands are better known, and have been more studied, than those of any other tropical country. In the following account not only actually injurious insects will be referred to, but also others which are frequently, but erroneously, supposed to be injuring the native forests.

The insects, to which damage is attributed most commonly in the case of the island forests, are generally spoken of as "borers" by those interested. In most cases the "borers" referred to are the larvae of large or moderately large beetles. There are, however, many small kinds of borer-beetles; in fact, these are far more numerous than the larger ones, though they escape observation from their diminutive size. Besides the beetle-borers, there are also a large number of other borers, especially the larvae or caterpillars of small moths. These are usually found in or beneath the bark of trees which have advanced to a further stage of decay than is attractive to most of the large beetle-borers, while quite decayed wood is often perforated through and through by various species of myriapods, creatures somewhat resembling small centipedes, but with the legs much more numerous.

Of the large beetle-borers three types are most conspicuous. All the larvae are white or yellowish grubs, most of them with-



FIG. 1

out legs, but two kinds have three pair of very minute legs, one pair on each of the three segments of the body following the head. The largest of these produces the beetle (*Aegosoma reflexum*) here figured with its larva (Figs. 1 and 2), and it can

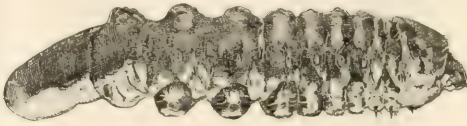


FIG. 2

not be mistaken for any other Hawaiian insect. It is not at present known from elsewhere, though very similar species are found in other countries. This beetle is remarkable for the diversity of its habits. The grub feeds sometimes in the wood of the hardest forest trees, generally in dead trees, but sometimes in those that are apparently healthy—e. g., in living trees of "Naio," the bastard sandal. On the other hand, it breeds freely in old decayed tree trunks or smaller logs, that are sometimes so rotten that they can be pulled to pieces by the hands, and so wet that the water can be squeezed from them as from a sponge. This species is found throughout the forests of all the islands. In some localities, where forest land has been cleared for raising cane or coffee, the beetle persists for some years. On Maui we once found numbers in cane fields, where they lived beneath the soil, boring through the stools and doing some damage. In Olaa, when coffee was being grown in that district, many trees were injured by being cut through or perforated beneath the soil by these large grubs. The latter and the beetle itself vary much in size, so that some of the adults are not more than half the size of others. The beetles are attracted by light at night and so are sometimes captured as curiosities, but otherwise they are much less frequently noticed than the larvae.

The only other large borer grub, which possesses the minute legs referred to, has very much the habits and appearance of the preceding. It is very partial to dead or partly dead Koa trees, but is found in other trees—e. g., the Kopikō and Kookea, and also in quite rotten logs that lie upon the ground. It is doubtful whether it ever attacks the living parts of apparently healthy trees, as the preceding does. The mature beetle is a large, dark brown, flattish beetle, found beneath bark in the forest and attracted by light at night. The male has very large, prominent jaws, like those of some stag-beetles. Its name is *Parandra puncticeps*, and it is peculiar to the islands.

The borer beetles, whose work is most commonly noticed by the non-entomologist both on cattle ranches and in forest clearings, form a group (with many species) which is quite peculiar to the Hawaiian forests. The mature beetles are of extraordinary

appearance and have a superficial appearance of some crickets rather than of more ordinary beetles. The species figured (*Platymysus darwinianus*, Fig. 3) is one of those that attack the "Mamani" on the Island of Hawaii. The larvae of these beetles much resemble the borers previously mentioned, but are easily distinguished by the absence of the small legs on the three segments of the body behind the head. Owing to the fact that numerous species attack the two common and important forest trees, the Koa and Mamani, and that their work is so conspicuous on the dead trees when the bark falls off, many complaints as to the injury done by them to the forest have been received from various localities, but more especially from the upper forest country of cattle ranches on Hawaii.

The cricket-like beetles referred to in the previous paragraph (fig. 3) which are so often reported from the forests as injur-



FIG. 3

ing the trees, are not only of interest from their peculiarities of structure, but also from their habits. Nearly all the known species described and undescribed (which at present exceed 50 in number) attack, each one, only one kind of forest tree. The exceptions to this rule are very rare. Some trees, like the Koa, Mamani, Alani and Mamaki, have several or many species that feed on them, but a good many native trees have never yet been found subject to their attack. Other trees commonly affected by these borers are the Ohia, Ohia-ha, Ahakea, Aiea, Naeo, Heae, Akoko, Koolea, Opuhe, and others more rarely. The stems of the Akala are also bored by one species. There is no doubt that, injurious as these borers appear to be, very few of them will attack trees that are in a really healthy condition. As soon as a tree is in-

jured in any way by fire or axe, by drought or by exposure of the surface roots to a hot sun from destruction of undergrowth, by defoliation from swarms of caterpillars or from natural decay, it is liable to be attacked by the special kind or kinds of these borers that affect it. By the outsider the work of the borer is usually noticed after the death of part or the whole of the tree, when the borings beneath the bark and the numerous exit holes of the beetles become obvious; but those who are observant may notice the beetles themselves running rapidly in the sunshine over the trunks and branches of still living trees. At night and on wet days they usually remain hidden in the undergrowth. If held in the hand, they squeak audibly, and some of them have no less than three different sets of sound-producing apparatus. A few appear to be found in apparently healthy trees and not to particularly injure these, since they produce abundant seed annually in spite of the attack. These beetles are so rarely found in forests that have not been interfered with by man and his animals, that it is quite certain that, in a natural condition of the forest, they are beneficial rather than injurious insects, as they help to remove old and sickly trees and make room for younger growth. Two parasitic wasps attack the larvae of these borers, and in some cases cause a great mortality. In the case of one species, of more than one hundred larvae collected, only two produced beetles, all the others yielding parasites. One species of the latter is a comparatively recent introduction, the other, though doubtless an accidental importation, has been known for more than thirty years. On Maui a very remarkable native bird (*Pseudonestor*) exists, which is peculiar to that island, and is specially formed for securing the larvae and immature beetles of these borers. On many occasions its food was found to consist solely of these, and the number destroyed was remarkable. Other native birds that are allied to the *Pseudonestor*, and which are seen in the same trees, feed on other species of borers, but either are not able to obtain this kind or else they have no liking for them. It is a matter for surprise that, excepting on Maui, none of the common native birds with woodpecker-like habits should have availed themselves of such a food supply.

In Figs. 4 and 5 are shown two small weevils much magnified, since they do not exceed one-quarter of an inch in length or are still smaller. Fig. 4 is a species of *Dryophthorus*, of which there are many different kinds, black and reddish in color, small dirty-looking insects, often smeared with excretions and adherent particles of rotten wood. They are frequently extremely numerous in dead trunks or branches of trees and also in rotten logs lying on the ground. Many individuals associate together, and these companies frequently consist of several different species. None of the species can be considered as at all injurious to the forests, though they are sometimes supposed to be so by those who have not studied their habits. On the lowlands one species, which is no doubt an introduction, does much damage to boards, if they

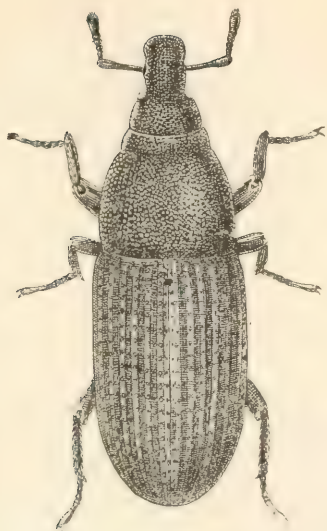


FIG. 4.

are left lying on the ground, especially in damp places, where it perforates the wood in all directions. These beetles appear to be very rarely attacked by parasites, but some of them are freely eaten by native birds. Fig. 5 shows one of the more or less



FIG. 5

metallic or brassy weevils (*Oodemas*) that are quite peculiar to the islands, and occur in all forests. They never attack healthy wood, and rarely that which is not entirely dead, so that any supposition that they are the cause of the death of trees or their branches is erroneous. Many other small native beetles are also found in connection with dead forest trees, but none of these can



FIG. 6

be considered of any economic importance. Fig. 6 is a representation of a very minute beetle, about one-eighth of an inch in length, much magnified. This borer (*xyleborus pubescens*) belongs to a family notorious throughout the world, but especially in colder countries, for the injury that is done by its members not only to forest, but also to shade and fruit trees. To the same genus belongs the so-called "shot-borer" of the cane fields in the West Indian Islands. There are many species of these "shot-borers" in the forests, most of them being indigenous and apparently doing no harm, since they only attack very unhealthy trees, while others like the one figured attack trees, which, if not perfectly healthy, at least would be likely to recover, but for the borers. On one occasion a forest fire in the mountains of the Waialua district of Oahu slightly scorched many large Koa trees, which would almost certainly have recovered had they not been attacked by this common shot-borer, which rapidly increased to many millions in the area of the fire. On another occasion the Halapepe trees, once numerous in Nuuanu valley, were attacked by another species, almost every tree being riddled with its borings and many trees were killed outright. Closely allied to the shot-borers are other still more minute beetles (*Hypothenemus*) which are occasionally injurious in the lower forest, and one of the species is notorious from the fact that it attacks the alligator pear trees and becomes very numerous. It is questionable, however, whether the trees, so attacked, have not first become diseased. The smallest species of all (*H. cruditus*) is not only numerous in the lower forests and on the lowlands, but sometimes is found in houses, boring into the covers of books or other material. This species is occasionally attacked by a very minute parasite, but, generally speaking, all these small borers are free from parasites.

Very similar to the shot-borers, but rather larger than most of these, is another borer (*Crossotarsus externodentatus*) which is also found very numerous in alligator pear trees, often in company with the former. It is easily recognized by the different structure of the legs and the remarkable form of the wing cases,

which end in an acute point on each side, and leave the tip of the body exposed to view.

Though not injuring the trees themselves, mention must be made of a curious weevil, of remarkable form and sculpture, which first became injurious in Honolulu in 1900, having, no doubt, been imported with ferns, somewhat previous to that date. On the settlement of Pacific Heights it must have been carried up with ornamental ferns, and it soon spread along the ridge, attacking the native tree-ferns. By 1902 it had become extremely numerous and injurious over a limited area, and is slowly spreading across the mountains. Being without wings, its progress is naturally slow, as compared with a flying insect. This borer is only known elsewhere from Australia, and was described under the name of *Syagria fulvitarso*.

(To be continued.)

SEA ISLAND COTTON IN HAWAII.

One difficulty which has been experienced in growing Sea Island Cotton in Hawaii is that of excessive yield, which results in a too prostrate form of growth.

In one locality on the windward side of Oahu, where the rainfall is about 70 inches per year, two acres of Sea Island cotton required about 5000 props in order to keep the branches from lying upon the ground and causing the bolls to rot. In this respect the Caravonica cotton is superior to Sea Island, since it invariably has an upright habit of growth. The difficulty experienced with the prostrate habit of the Sea Island can be appreciated from a consideration of the fact that, in the two-acre field just mentioned and in another one-acre field, on the leeward side of Oahu, the average number of bolls per plant was 700, and on one tree 1200 bolls were counted at one time. This produces a weight under which the slender branches of the Sea Island can not support themselves in an upright position.

An elaborate series of pruning experiments is now being carried out with the idea of learning a method by which an upright growth can be induced in the Sea Island cotton, at least for the second and subsequent years of the crop. Some promise is already held out by these experiments. A strain of Sea Island, secured from one of the best plantations of James Island (South Carolina) shows a more upright habit of growth than any other strain of Sea Island which has thus far been secured.—*Agricultural News* (W. I.).

PINEAPPLES AND DIVIDENDS.

While pineapples are probably grown with more profit in the Hawaiian Islands than any part of the world, it is only because the planters have studied this product, and applied to it the most adaptable methods to produce a finely matured fruit. And the result has read something like a fairy story from King Midas; the profits have even astonished the planters who were interested in the estates growing pines, and ten years previous to their first big crop in 1902, you could scarcely get a Hawaiian planter to look at a pineapple. It was because a longheaded man, then secretary of the Planters Association of Hawaii, told that body of men that some day their sugar crop (which is the principal product of the Islands) would fail. Then what would they have to fall back on, except small crops of coconuts, rice and bananas, which would not tide them over to another season. Some of the members sat up and took notice. Immediately all the information and samples possible were obtained from the other pineapple-growing countries of the world. Companies were formed, areas planted with different species, and the authorities established an experiment station, where a scientific study of pineapples was conducted. The outcome has been a most delicious and healthy fruit which is gaining a famous reputation around the world. The renewed interest in the pineapple situation here begins to look as if the subjects would be taken up seriously before long, and investigated with a view to undertaking the pineapple project on a substantial scale. While most of the planters of Ceylon have rubber to fall back on if tea should fail, and *vice versa*, at the same time, inter-planting has seen its best day, and even now many of our largest planters are contemplating its abolition as a method conducive to producing either better tea or better rubber, each planted separately. Some of the planters will eventually devote themselves to one or the other exclusively. In any event, both rubber and tea crops are subject to ravages by droughts, pests and storms, while the pineapple, hardy and easily cared for, grows low, and is in nine cases out of ten, a sure crop.

That the pineapple is to be one of the principal fruit productions of all tropical countries is exemplified in the reports of the agricultural departments from Japan (covering Formosa), the Philippines, Java, Cuba, Puerto Rico, Panama, Florida, Mexico, Southern California, parts of India; and experiments are even going on in certain districts of British South Africa. At first the problem of shipping from Ceylon seems a difficult one; but when it is considered that the pineapple can be shipped, partly ripe, and by the time it reaches its destination, is in the pink of condition; also when the shipments are once under way, and kept going, the transportation question shrinks into insignificance. Another point in favor of growing pineapples is that first class, finely matured fruit always brings a good market price, and the

demand is invariably strong. Second and third grade fruit finds a ready market for preserving and canning purposes in all of the big world centers. One large canning factory in New England last year offered to contract for, and take all the pineapples which Cuba, the Philippines and Hawaii could raise together. And they all refused to make contracts, for the individual market demand was so great that they could afford to be independent. We are glad that our government officials are looking into the matter, for we have faith in Ceylon as a future pineapple country, and if our planters can produce as fine a grade of this fruit as of tea and rubber, it is our prediction that within ten years we will be running Hawaii a close race for first position. Once the pineapple industry is started on a proper scale, and handled judiciously, there is little doubt as to the profits and certainty of crops. Dividends of from 40 to 60 per cent. on common pineapple shares are reported from Honolulu last season, and many of the Cuban companies paid as high as 50 per cent., which is an excellent showing in consideration of the quality of Cuban pines as compared with those grown in Hawaii. We have recently received several interesting letters with regard to pineapple growing, and some definite action will no doubt be taken soon, as to a further investigation of this subject.—*Tropical Agriculturist*.

GIANT ALOE AT KEW.

On one of the lawns near the cactus house at Kew there is now a magnificent example of the pulque plant *Agave atrovirens*, from the llano or plains of Apam, Mexico. For many years this plant has been a striking object among the many species of agave cultivated in the cactus house, its age being about thirty years. Until the pole-like flower spike commenced to develop there was ample head room in the house for the plant, huge though it is; but when the spike reached the roof, the end of the house was removed and the plant run out on planks and rollers to its present position where, unless the weather of the next few weeks disagrees with it, the flower spike should be at its best towards the end of June. At present the spike is about 12 feet high and 6 inches in diameter, but, judging by a specimen which flowered about twenty-five years ago, it should attain a height of 25 feet, with numerous branches arranged candelabra fashion, and bear a large number of yellow lily-like flowers. The leaves are arranged in an enormous rosette about 12 feet in diameter, and they are about 8 feet long, 10 in. wide, very thick and solid, their color glaucous green, their margins clothed with short spines, and the apex armed with a long sharp spike. In a broad sense this is one of the American aloes or century plants, whose life period varies from ten to fifty years, or even longer, according to circumstances, but they

ALL FLOWER ONLY ONCE AND THEN PERISH.

A. atrovirens is of exceptional economic interest, as from it is prepared the fermented drink called pulque, the favorite beverage of the Mexicans, who cultivate the plant on an extensive scale for the sake of the sweet sap which it secretes when it has arrived at maturity and is about to flower. The sap is obtained by cutting off the top of the flower stalk at any early stage and hollowing out the stem to form a cup into which the sap flows, and is removed several times each day until it ceases to run. The sap is then placed in bull-hide vats to ferment, a kind of yeast being added to hasten fermentation, the entire process resulting in the end in a variety of wine, resembling in color and general appearance the *weissbier* of Germany. It is an agreeable wholesome drink, being a valuable nutrient as well as a mild stimulant, as it contains from 4 to 8 per cent. of alcohol. Pulque is said to be good for inflammatory and catarrhal conditions of the bladder and kidneys, and to be an almost unfailing remedy for what is known as Bright's disease. It is now prescribed by American physicians, who even send their patients to Mexico to drink fresh preparations of it, as it is liable to secondary fermentation a few hours after it has been made, which renders it unwholesome.

There are countries in the British Empire where the conditions of soil and temperature are such as would favor the growth of this agave; for example the plains round Johannesburg, where, to those engaged in the mines, a plant that yields both wine and medicine and requires practically no cultivation would be a blessing. There is a useful fibre also in the leaves of this plant, not so good perhaps as sisal hemp, but good enough for many purposes. If once established in a country this agave would reproduce itself naturally, and most likely with great prodigality, by means of seeds and stem bulbils, which it bears in profusion. Of course it might prove a nuisance by providing a cheap intoxicating drink to natives, thus reducing their value as workers. It is worth trying on a small scale, anyhow.—*Field*, April 13.

"THE LARGEST PIECE OF RUBBER."

In our last issue we asked if any of our readers knew of the largest piece of raw rubber on record. We referred to a biscuit weighing 559 pounds, which was exhibited at the Rubber Exhibition of 1908, and also to a block which figured at several tyre exhibitions, and weighed about 8 cwt. This week we are enabled, by the courtesy of the St. Helen's Cable and Rubber Co., Ltd., Warrington and London, to publish a photograph of a piece of Fine Hard Para, which they bought about five or six years ago. This block weighed nearly half a ton, to be exact 1100 pounds, and was shown at several exhibitions about the country. It is claimed that this is the largest piece of rubber ever imported.—*India Rubber Journal*, April 20.

POSSIBILITIES OF RUBBER PRODUCTION.

"West Indian rubber planters have awakened to the fact that quite a number of their trees, believed to be pure *Hevea Brasiliensis*, are hybrids. This has caused the planters not a little distress, because these particular hybrids are much less productive of good rubber than the pure *Hevea*," says the *India Rubber World*; "but it serves once more to bring up the general subject of hybridization, with its natural suggestion of the possibility of such hybridization, or cross fertilization or grafting, as will enable some variety of the rubber-producing tree to be grown in the more southerly sections of the United States.

"It is doubtful if a botanically pure *Hevea Brasiliensis* actually exists. There are twenty varieties of the *Hevea* along the Amazon; there are seven or eight varieties of *Manihot* in the most easterly part of Brazil; and of *Castilloas* there are, north of the Amazon, probably twenty different varieties. Which of these many varieties represents the pure parent stock—if any of them does—it is impossible to tell. Hybridization seems to be the general law in the rubber family, and if it could be directed in such a way as to produce a rubber tree capable of withstanding such temperatures as we have in our more southerly States, a vast field for rubber planting would be opened at once.

"The advantages of such rubber planting are too obvious to need enumeration. The most conspicuous may be referred to in a few words—the utilization of great tracts of land now practically going to waste; the easy solution of the labor, provision and sanitation problems that are so difficult in the Amazon country; a great decrease in transportation charges; freedom from exacting duties. All these and many other advantages point to the great desirability, if practicable, of rubber growing in our own country.

"On the face of it, it does not seem necessarily impracticable. There are several plants indigenous to the United States that are quite closely related to the varieties of the rubber tree. Our ordinary milk weed, of which there are some fifty different kinds in the United States, is a cousin of the *Hevea Brasiliensis*, and some of its varieties, particularly those in Florida, that attain the size of a tree, bear something of a family resemblance."

WOODLOTS ON FARMS.

"Growing a Woodlot from Seed" is the subject of an article in *American Forestry* for June written by J. A. Ferguson of the University of Missouri. Part of it deals with this very subject Mr. Cox has mentioned, and says:

"Every farm should have a woodlot to furnish fuel, fence posts and other wood material needed. Especially is this true in the less wooded regions like the prairies, where wood products must

often be transported long distances at considerable expense. Nearly every farm contains some land that is too poor for raising crops or that is not available for grazing or other purposes, which usually lies idle year after year. This land is a burden to the owner because it brings in no returns, yet must bear its share of the taxes. Such land ought to be devoted to the raising of forest trees. When we consider that an acre of land planted to fast-growing trees will produce from one to three thousand fence posts in twenty years, and that with some species fence posts can be secured in less than ten years, a farmer, by allowing waste places to stand idle, is losing a return he could secure by a slight effort. It is not a difficult matter to start a woodlot, neither is it an expensive one. It can be done without any cost to the owner except the time and effort necessary to grow and plant the trees.

"One reason why farmers do not start forest plantings is because they believe large trees are necessary which can be purchased only at considerable cost. The best trees for starting a woodlot are one-year-old seedlings, which can easily be grown from seed by the farmer himself. Every farm should have a forest nursery for growing trees for starting forest plantings. Such a nursery can also be used to grow larger trees for planting about the house, along the roads and for making windbreaks. It should be located on well-drained fertile soil such as might be selected for a garden. Where the space can be spared a portion of the vegetable garden makes an ideal nursery site. The soil should not be made excessively rich, as too fertile a soil will produce a rank growth in the seedlings, making them difficult to handle in transplanting."—*The North Woods* (Minnesota Forestry Association).

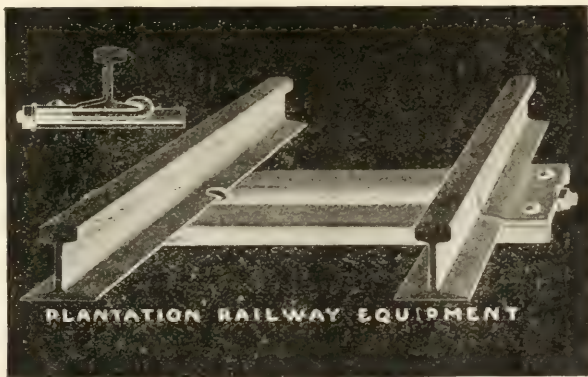
RELIGION OF THE WOODS.

Tribute to the presence of God in the woods, recently was paid by Rev. George R. Gebauer, pastor of the First Unitarian church in Duluth, while delivering a sermon on the subject, "Influences." The following pretty eulogy of the stars and woods and the sermons they preach, came from him:

"It was none less than the great Kant who said: 'The two things which most overawe me are the starry heaven above and the moral law within.' He said nothing of any relationship between the two, but to me there seems to be such. I am convinced that if only we would take our children into the star-lit silence of the night, and in the presence of this visible Infinite speak to them of the Infinite and the eternal law of goodness, we should find them much more receptive than in our Sunday schools with their sanctimonious trimmings. What the stars preach to us is truly 'heavenly,' and the sweet influences of the Pleiades creates a reverence which holy scripture will hardly give in such rich and pure measure.

"It is wrong to speak of a dead world of matter, if thus the very stars speak to us. No, this is not a soulless universe and Arcturus and Vega, and the farthest nebula are filled with the divine soul and try to draw us upward. And as the stars preach to us, so does the earth; nature about us uplifts the sore and troubled soul. The woods and the hills say to us, when we come with fevered brow from the daily pursuits, as Emerson puts it: 'Why so hot, little man?' Yes, it is nature that tells us that man is more than a dollar-earning or dollar-grasping animal, and that his life may be measured by something else than the capacity for making money, and wasting wealth. Yes, life in the end is only true life when it is close to nature; a life is only full when it can look in reverence up to the stars and love nature as a divine mother.

"I think it would be a blessed thing to close for the summer not only the school, but the churches, and turn the saints and sinners to pasture, if people would only forget themselves there. How it might expand those shriveled souls, the souls of poor over- and under-formed humanity, of pale-faced, gospel-ridden churchgoers, of miserable sermon-crammed sinners, simply to go into the woods and become saints and sinners and reformers and 'such like.' Not that we do not need the prophets and preachers, but that it is well to get away from them for a time."



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Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 84 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation. Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
 "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
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- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 5; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws. 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 18 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

AUGUST, 1912.

No. 8.

This is the "Annual Reports" number of the Forester and Agriculturist, containing a resume of the work of a year in every division of the Department of Agriculture and Forestry by its chief. It should be preserved for reference by all subscribers, although it is to be hoped that few fail to preserve all numbers of the magazine for adding to their libraries in bound form.

The bureau of agriculture of the Philippine Islands is taking up the culture of date palms, and among other things is planning to plant 150 at Linao experiment station to form an avenue of these palms to be known as Eden avenue. This name is chosen from the fact that the fruit from which the seed is taken came from the Garden of Eden, or at least that portion of the old world in which it is generally acknowledged the Garden of Eden was located.

A broadside has been received giving announcement of the Seventh International Dry Farming Congress—the "World's Greatest Agricultural Convention"—to be held at Lethbridge, Alberta, Canada, October 21-26, 1912. All farmers are invited to attend and participate in the event. This congress of farmers will consist of nine sectional conventions, as follows: Conference on Soils, Tillage Methods and Machinery; Conference on Crops and Crop Breeding; Conference on Agricultural Forestry; Conference on Live Stock and Dairying; Conference on Agricultural Education; Conference on Farm Management; Conference on Scientific Research; Conference of Agricultural Colleges and Experiment Stations, and International Congress of Farm Women (Rural Home Section of the International Dry Farming Congress). The Congress will be formally opened on Monday, October 21, at 11 a. m., by His Royal Highness the Duke of Connaught, Governor General of Canada, for the government of Great Britain, and Honorable James Wilson, Secretary of Agriculture of the United States, as personal representative of President William Howard Taft. The international delegates will include distinguished agriculturists of many countries. The governors of some American states, government officials of the Dominion of Canada and all western provinces will be in attend-

ance. Delegates may be appointed by governors, mayors, and all agricultural bodies and commercial organizations, but every farmer is invited without the formality of credentials, and all discussions will be open to farmers. Address all communications to John T. Burns, Executive Secretary-Treasurer, Lethbridge, Alberta, Canada.

CONTAGIOUS ABORTION AND MILK.

Circular No. 198 of the Bureau of Animal Industry, United States Department of Agriculture, reports the discovery that the bacterium of contagious abortion of cattle, occurs in milk. The organism was found in 8 samples of market milk among 77 samples tested (over 11 per cent.), and in the milk distributed by 6 among 31 dairies (over 19 per cent.). The discovery was made as the result of investigations conducted by Dr. John R. Mohler, chief of the Pathological Division. When milk containing the organisms was injected into guinea pigs, it produced lesions resembling closely those of tuberculosis. The effect on human beings is not known, but the circular states that the phenomenon is ominously serious to public health, and that "the bacillus forms another link in the long chain of facts that point unmistakably to the proper pasteurization of all milk before it is used as food as a measure essentially necessary for the protection of the public health."

APPRECIATION FROM CALIFORNIA.

San Francisco, April 18, 1912.

Daniel Logan, Editor The Forester, P. O. Box 366, Honolulu, T. H.

Dear Sir:—Referring to your issue of March, Vol. IX, No. 3, I beg leave to express my hearty appreciation of the value of the paper by Ralph S. Hosmer on the proposed reclamation of the Island of Kahoolawe. It is such painstaking and meritorious work now being carried on by so many in the public service, that rolls up such a grand total of accomplishment for good throughout our entire country.

Your publication is received regularly by the Sierra Club, and I assure you is appreciated, as it is the exponent for the Hawaiian Islands in those achievements for which the Sierra Club, at least in certain directions, carries on its activities. You have our hearty best wishes for every good achievement in the field of endeavor, which you particularly stand for.

Very truly yours,

E. T. PARSONS,
Member Editorial Board of Sierra Club Bulletin.

*ANNUAL REPORTS OF DIVISIONS OF FORESTRY,
ENTOMOLOGY AND ANIMAL INDUSTRY.*

Honolulu, July 25, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu, T. H.

Dear Sirs:—I beg to transmit herewith, for publication in the Forester and Agriculturist, copies of the Annual Reports of the Superintendents of Forestry, Entomology and Animal Industry for the calendar year 1911.

Yours truly,

W. M. GIFFARD,

President and Executive Officer, Board of Agriculture and Forestry, T. H.

DIVISION OF FORESTRY.

Honolulu, April 10, 1912.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a brief report covering the main lines of work carried on by the Division of Forestry during the calendar year 1911.

In conformity with established policy the efforts of the Division were directed chiefly (1) to measures looking to the maintenance in good condition of the native forests, particularly those set apart as forest reserves, and to the extension of the forest reserve system; (2) to the encouragement of tree planting on government land and also by private owners, both through advice as to where, what and how to plant and through supplying plant material free, or at cost price; (3) to the giving of assistance, in person, by letter and by publications to persons desiring information on forest matters; (4) to carrying forward, as far as limited funds permitted, the experimental planting of trees and shrubs new to Hawaii; and (5) to protecting local forests from fire through the maintenance of a forest fire organization.

For the nine months' period from April 1 to December 31, 1911, during which a monthly allotment of \$3,500 was made to the Board of Agriculture and Forestry for the Conservation Fund for routine work, the amounts expended by the Division of Forestry were for salaries and pay rolls \$7,408.65, for current expenses \$730.58, a total of \$8,139.23.

During the year there was turned in to the treasury of the Territory from the Division of Forestry, as government realizations, a total of \$612.75, made up as follows:

| | |
|--|----------|
| Sale of plants, Government Nursery..... | \$401.35 |
| " " seeds, Government Nursery | 13.40 |
| " " wood, Tantalus forest | 48.00 |
| " " plants, Homestead, Kauai, Nursery..... | 150.00 |
| | <hr/> |
| | \$612.75 |

FOREST RESERVES.

During the year two new forest reserves were created, South Kona and Puna, respectively in the Districts of Kona and Kau and of Puna, on the Island of Hawaii. The South Kona Forest Reserve has a total area of 36,952 acres, of which 29,260 acres, 79 per cent., is government land. The Puna Forest Reserve was set apart June 29, 1911. The area is 19,850 acres, all government land.

In Hawaii the greater portion of the forest area set apart, is reserved because of the value of the forest as a protective cover, which under the conditions of climate and topography that obtain locally, is needed to safeguard the headwaters of the streams that are diverted for use in irrigation. In other words, most of the Hawaiian forests are of what has been termed the "water bearing" class. In both of the reserves created in 1911, on the contrary, the primary importance of the forest is on account of the timber value of the trees, present or prospective. Both are in districts where there are no running streams. In both the forest is of the "commercial forest" class.

In February, 1911, the boundaries of two of the older forest reserves, West Maui and Kau, were slightly modified and the areas a little increased. At the end of the year there were 25 forest reserves with a total area of 631,956 acres, of which 435,657 acres, 69 per cent., is government land.

In June, 1911, under the terms of a logging license issued prior to the creation of the reserve, the sum of \$2,955 was paid to the Board of Agriculture and Forestry for timber to be cut in the Puna Forest Reserve. Under the forest law this money can be used elsewhere in the Territory for forest work. Up to the end of the year it has not been drawn against.

Progress was made during the year on a number of other forest reserve projects, in the way of examination in the field or the completion of the technical descriptions of boundary. Condemnation proceedings instituted by the government for the acquisition of a portion of the lands of Kehenā 2 on the Kohala Mountain, which it is proposed be included in the Kohala Mountain Forest Reserve, were still pending at the end of the year.

FOREST PLANTING.

The second main line of work carried on by the Division of Forestry is the encouragement of tree planting both on government land and by private owners. Under a special allotment of the Conservation Fund a contract was entered into in May, 1911, with Mr. A. W. Carter, Manager of the Parker Ranch, for the planting of an area of approximately 50 acres on the Kohala Mountain above Waimea village, Island of Hawaii, in accordance with a planting plan drawn up by the Division of Forestry. Planting was begun in the summer and was in progress at the end of the year. The object of this work is to reclothe with trees open areas on the watersheds of streams that are needed for economic use on the Waimea plains. The trees planted are mainly Eucalypts. The seedlings were raised at the Parker Ranch Nursery at Waimea.

Under another special grant from the Conservation Fund the contract for forest planting at Pupukea, Oahu, begun in 1910, was completed in the early part of 1911. The bulk of the planting was accepted in April; final payment was made in October. About 30 acres were planted.

Owing to limited funds only these two forest planting projects were carried on in 1911 directly by the government, but considerable other planting was done on government land at private expense, under requirements of government land leases, or through special agreements, or voluntarily by corporations or individuals holding the lands for a long enough time to enable them to be willing to undertake planting.

In December a planting plan was drawn up by the Division of Forestry for government lands in the Kula District, Maui, held by Cornwell Ranch under a government lease requiring tree planting. Earlier in the year inspections were made of tree planting in progress, under similarly worded government leases on the Parker Ranch and the Kukaiau Ranch on Hawaii. Visits of inspection were also made during the summer and autumn to the Islands of Lanai and Kahoolawe, to various forest lands on Oahu, and to the land of Muliwai, Hamakua, Hawaii, the high plateau between Waipio and Waimanu gulches.

In September a general program of forest planting was worked out at the request of the Alexander & Baldwin interests, for the lands lying along the irrigation ditches in the Koolau district on Maui. The object of this project is to replace the forest cover on the area where it has been opened up in recent years through one and another cause. Much of the area to be planted is government land. Planting under this plan began in the autumn of 1911 and is actively going on.

To study conditions in the native forest on the windward side of Maui and to confer with the local forest officials in regard thereof, arrangements were made in the early spring of 1911,

whereby Mr. H. M. Curran of the Philippine Bureau of Forestry, made a month's visit to Hawaii in April and May. A brief report containing the recommendations made by Mr. Curran was published in June, 1911, issue of the Hawaiian Forester and Agriculturist.

Forest planting under private auspices was more general throughout the Territory in 1911 than in any earlier year. Exact figures by plantations are not available, but the total number set out was probably close on a million trees. The figure for 1910 was 725,000. In this work the Division of Forestry had a considerable share for over 587,000 seedling trees were sold or given away from the Government Nursery during 1911, of which 339,000 were furnished to corporations doing extensive planting. Under an arrangement whereby plantations are supplied with tree seedlings in boxes, just ready for the first transplanting, a number of companies that had not before cared to be bothered with the details of getting nursery stock ready, in 1911 undertook tree planting.

Tree planting by sugar plantation companies is usually done, either to provide windbreaks for exposed cane fields, particularly along the sea shore on the windward side of the islands, or to establish groves from which fuel wood may in time be cut. The good results obtained in recent years will undoubtedly lead to a further extension of this work.

Following is a statement of the trees given out during 1911 from the Government Nursery at Honolulu, including the branch Nursery in Makiki Valley used in part as a propagating station, and from the sub-nurseries maintained by the Division of Forestry at Hilo, Hawaii, and at Homestead,, Kauai:

FROM THE GOVERNMENT NURSERY AND MAKIKI STATION.

Sold and given gratis, including Arbor Day, January 1 to December 31, 1911:

Regular Distribution.

| | In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|-----------------|-------------------|---------------------------|---------------|---------------|
| Sold | 159,350 | 12,282 | 9,349 | 180,981 |
| Gratis | 35,900 | 9,823 | 10,184 | 55,907 |
| Arbor Day ..... | ..... | 1,508 | 10,000 | 11,508 |
| | <hr/> 195,250 | <hr/> 23,613 | <hr/> 29,533 | <hr/> 248,396 |

Special Plantation Orders.

| | | | | |
|----------------------|---------------|--------------|-------------|-------------|
| Jan. to June, 1911.. | 114,000 | ..... | ..... | 114,000 |
| June to Dec., 1911.. | 214,000 | 11,000 | ..... | 225,000 |
| | <hr/> 328,000 | <hr/> 11,000 | <hr/> | <hr/> |
| Totals | 523,250 | 34,613 | 29,533 | 587,396 |

FROM THE SUB-NURSERY AT HILO.

For the calendar year 1911, Brother Matthias Newell reports that 12,104 seedling trees were given out from the Hilo Nursery. The species in demand were several Eucalypts, Ironwood, Silk Oak, Monterey Cypress, Japanese Cedar and various ornamentals. Considerable attention was paid to growing trees for school grounds and many seedlings were given out to school children to plant at home.

FROM THE SUB-NURSERY AT HOMESTEAD, KAUAI.

Mr. Walter L. McBryde, Special Agent in charge of the Homestead Nursery, says:

"Our records show that during the year 1911 we sold and gave away free to homesteaders some 11,239 trees. Had we had a larger number of trees on hand we no doubt would have been able to increase this amount, by at least double."

In addition to the distribution there were planted out in the Papapahohola Experimental Reserve something over 4,000 trees. These, with the other trees planted in former years, are making good growth.

ADVICE AND ASSISTANCE.

Continuing the custom of former years much of the time of the Forest Nurseryman in 1911 was taken up in giving advice, verbally and by letter, to persons desiring information about the planting and care of trees. That this is a useful branch of the work of the Division of Forestry is attested by the many applications that are constantly being received. When necessary a visit is made to the premises where the work is to be done so that local conditions can be studied on the ground.

On the side of education in forestry various speeches and addresses were made during the year by the Superintendent of Forestry, more particularly in connection with Arbor Day and before the Hawaiian Sugar Planters' Association at its annual session in December.

In addition to the regular routine reports and those having to do with forest reserve and other special projects, the Superintendent of Forestry prepared during the year a number of articles on forest subjects for the newspapers or for the Hawaiian Forester and Agriculturist. Not a little of his time was given during the first three months of the year to seeing through the press the Report of the Board of Agriculture and Forestry for the biennial period ending December 31, 1910.

In May there was issued as Bulletin No. 1 of the Division of Forestry an illustrated bulletin entitled "Eucalytus Culture in Hawaii," by Mr. Louis Margolin of the U. S. Forest Service.

This bulletin is the result of the investigation carried on in 1910 with the coöperation of the Forest Service, when all the planted groves of Eucalypts in Hawaii were visited and all the information locally available in regard to Eucalypts got together. An edition of 3,000 copies was printed. The bulletin was given a wide distribution throughout the Territory.

SPECIAL INVESTIGATIONS.

Part of the duty of the Division of Forestry is to introduce into Hawaii exotic trees and shrubs of economic importance, that will grow here and be of service to the people of the Territory. This work of plant introduction is carried on principally at the Government Nursery at Honolulu and the Experimental Garden in Makiki Valley. During 1911 many plants new to Hawaii were started and made ready for distribution. The only way definitely to find out how exotic trees will succeed here is to try them. This is a line of work to which more attention should be paid.

In this connection it is appropriate to note that for several years now the Federal Forest Service has made annually an allotment for experimental forest planting in Hawaii. In the beginning all the money was used for the trial of temperate zone trees in fenced enclosures on the upper slopes of Mauna Kea and Mt. Haleakala. In 1911 an experimental plantation of Eucalypts was established in Nuuanu Valley. Sample plots of eighteen different species were planted—kinds little known in Hawaii, but reputed to be of economic importance. It is expected that an additional block can be started in 1912.

Until September, 1911, Mr. Joseph Rock was a regular member of the staff of the Division of Forestry, when he was transferred to the faculty of the College of Hawaii. Mr. Rock continues, however, as an honorary officer of the Board with the title of "Consulting Botanist."

In the spring Mr. Rock made collecting trips to Hawaii and Maui and in the summer again visited the Kau District on Hawaii. On each of these expeditions he collected much new herbarium material which was added to the collection. Pending the completion of the new building of the College of Hawaii, Mr. Rock continues to occupy quarters at the Board office on King street.

In September, 1911, there was issued as Botanical Bulletin No. 1 of the Division of Forestry, an illustrated 15 page pamphlet entitled "New and Noteworthy Hawaiian Plants."

In December another similar bulletin was issued by the College of Hawaii describing some additional new species, under the title "Notes upon Hawaiian Plants with Descriptions of New Species and Varieties."

By means of a fund raised through private subscription Mr. Rock expects in the near future to publish an illustrated book on

the native trees of Hawaii based upon data collected by him during his connection with this Board.

FOREST FIRE RECORD.

With the exception of a few small forest and grass fires on Oahu and a couple on Kauai all of which were, however, extinguished before serious damage had resulted, the forest fire record for 1911 is fortunately small. One of the fires on Oahu occurred in Manoa Valley in April, the other above Waialua in July. The fires on Kauai were in the woods back of Kilauea. Both occurred in June.

As in earlier years one ranger was employed throughout the year to patrol the Tantalus forest and to oversee the burning of brush, under permit, on Tantalus Heights.

Several changes in the staff of the volunteer fire wardens were made during the year, by which the efficiency of the service as a skeleton organization is maintained.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

Honolulu, December 31, 1911.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I have the honor to submit herewith the eighth report of the Division of Entomology, covering the work performed by my department during the calendar year 1911.

By far the greater portion of the work performed by the division during 1911 consisted in the quarantine inspection of agricultural and horticultural products, arriving from various countries by steamers and sailing vessels. In addition to this work we undertook the Inter-Island Inspection on July 1, 1911, adding two inspectors to our department whose main duty is the inspection of all shipments of fruits and plants in the freight and baggage of the Inter-Island traffic.

The working staff of the division remained about the same as in 1910 except that Mr. H. O. Marsh resigned his place in February on account of ill health and although we had hoped to obtain another assistant, we were unable to do so on account of the shortage of available funds. On November 15 we were able to obtain the services of Miss Louise Gulick as laboratory assistant

for half-day service to relieve the work in the laboratory caused by the breeding out of fruitfly material.

During 1911 we inspected 380 vessels, of which we found 216 carrying vegetable matter, amounting to 11,157 lot shipments, which consisted of the enormous total of 187,997 packages. Of this amount 178,559 were packages of fruits and vegetables, 2,517 were seeds and 921 were plants. Of these shipments we destroyed by burning 367 shipments, amounting to 1,000 packages, 26 packages were returned and 1,464 packages were fumigated before delivery.

The great increase of fruit and vegetable shipments from the coast and the increase in the steamer service and other freight shipments from foreign countries makes the work very arduous and at times, owing to the shortage of inspectors, very trying. Were it not for the excellent equipment we have on the Oceanic, Hackfeld (now Matson Steam Navigation Co.), and Alakea docks, which latter is our waterfront office for Inter-Island inspection, we would not be able to cope with the important work. Further assistance and larger funds will be absolutely necessary as soon as the Panama Canal traffic starts, for without question, there will be a very material increase in imports of all classes. We have been unable to carry on much work in the distribution of beneficial insects, despite the fact that many requests have been made for such work. All this is on account of the inability of the Board of Agriculture and Forestry to supply the necessary assistant in the laboratory owing to the lack of funds. For the same reason we have only been able to spare moments to attend to the upkeep of the valuable insect collection and have not had time to make many additions to it. The Superintendent has donated a series of named beetles of North America, which adds considerably to the office collection.

INTER-ISLAND INSPECTION.

In November, 1910, shortly after the discovery of the Mediterranean fruitfly on Oahu, the Board of Agriculture and Forestry passed Rule VII, which was duly signed by the Governor. This rule was passed for the purpose of preventing the spread of this pest from Oahu to the other islands and although we were able, through the coöperation of the Inter-Island Steam Navigation Company to prevent freight shipments of fruits and vegetables leaving Oahu to the other islands, we were unable, on account of the lack of funds and inspectors, to examine baggage and packages belonging to individual passengers leaving on the local steamers as our regular quarantine work required all our attention. It was not until July 1, 1911, over six months later, that adequate funds, \$6,000 for a period of fifteen months, were available, that actual work was installed. Two inspectors were employed and the search of all questionable baggage and parcels

taken on Inter-Island boats was then started. Although we all realized that this outgoing inspection would in a measure help prevent many infested shipments from leaving Honolulu, yet we fully realized that the system was not as efficient as the regular inspection of incoming shipments usually practiced in the foreign Quarantine Inspection of the Board of Agriculture and Forestry and other Boards of Agriculture on the mainland. However, under existing conditions and the difficulty of finding qualified men at the ports of the other islands and considering the enormous expense entailed with only a small amount available, the only possible system to adopt was that now in vogue. It was soon found that Rule VII was not broad enough to cover the requirements of the inspection and the Board of Agriculture and Forestry replaced Rule VII by Rule IX, which made the law more stringent. Rule IX was duly signed by the Governor on June 28, 1911. We soon found that many complaints were being sent in regarding shipment of taro and root crops, much in demand for food, with the request that provision be made allowing such shipment to go if used for poi making and food. Again, the matter was gone over and finally the Board passed Rule XI which took the place of Rule IX, by adding a proviso for taro, lily roots and other tubers used in the manufacture of poi and other foods. Rule XI was duly signed by the Governor on December 18, 1911.

Owing to the stand taken by the State of California in regard to fruit shipments from Hawaii since the outbreak of the Mediterranean fruitfly the larger shippers of pineapples and bananas, the only fruit still permitted to enter California, have had to compete with a lot of poorly graded and badly infested fruit in competition with their clean shipments. In looking over the field and possible means of overcoming such conditions, the Superintendent recommended the passing of Rule XII, which gives the Board the power to enter into and inspect any premise, property or field with trees, plants or crops and on finding conditions thereon to the detriment of the fruit industry, to recommend remedies therefor or to abate the nuisances.

The passage of this rule, which was signed by the Governor on December 30, 1911, will no doubt do much towards a better practice of clean cultural methods.

There is a marked improvement in some of the banana plantations through the cleaning up of old worthless plants which were badly infested with scale insects and the gathering and burning of all old leaves and rubbish, but only a few have been induced to carry out this method. The same can be said of the cotton fields where all infested bolls are gathered and burned. By the passing of Rule XII much of this work can be enforced with good results.

The banana industry of the Territory is a profitable one and generally speaking, banana culture is not hampered with any disease or pest when up to date cultural methods are used. Owing

to an outbreak of a serious disease of the banana in Central America, the West Indies and adjacent countries and in view of the fact that there was a possibility of bringing into the Territory banana plants from these sections, the Board of Agriculture and Forestry passed Rule VIII prohibiting the introduction of any banana fruit, banana sprouts or plants from Central America, including the Panama Canal Zone, the West Indies, Dutch Guiana or any other locality where the said disease exists or may become known to exist. An act passed by the last legislature to regulate the importation and sale of seed into and within the Territory did not provide funds for the appointment of a Territorial Seed Inspector; as my department has in the past inspected all seeds to prevent the introduction of seed pests, the duty now has fallen on my division to examine and sample seed shipments coming into the Territory. During the year we have kept samples of various forage seeds which were imported for planting. In every instance the seed was found very free from adulterations. Not being equipped for a thorough seed test by sprouting, no experiments were conducted on these lines.

Appended hereto are some tabulations showing the total arrival of vessels, their contents of vegetable matter and the disposition of the various shipments. Also a list of the pests intercepted in the inspection work.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

Injurious insects and diseases intercepted which were found on shipments of fruits, vegetables and plants imported into the Territory during 1911:

ORTHOPTERA—Eggs of *Holocloro* species in peach twigs, Japan; *Phyllodromia germanica*, *Periplaneta americana*, *Paus-tralasiae*—in various shipments of merchandise and vegetables from the Orient.

THYSANOPTERA—*Heliothrips haemorrhoidalis* on camelia, Sydney.

HEMIPTERA (*Heteroptera*)—*Capsus* species on pine tree, Japan; *capsus* species on orchids, Manila; *Tingid* species on orchids, Manila; *Aradid* species on orchids, Manila.

HEMIPTERA (*Homoptera*)—*Chermes* species on pine tree, Japan; *Lachnus* species on pine tree, Japan; *Macrosiphum san-borni* on chrysanthemum, Ohio, U. S. A.; *Aleyrodes citri* on orange leaves, Japan; *Aspidiotus cyanophylli* on palm, Florida; *Aspidiotus cydoniae* on cocoanut, Central America; *Aspidiotus perniciosus* on peach tree, Japan; *Aspidiotus nederæ* on lemons, Sydney; *Chrysomphalus bififormis* on cocoanut, Central America; *Ceroplastes rusci* on loquat, Japan; *Coccus hesperidum* on *Rhodea japonica*, Japan; *Chionaspis permutans* on lemons, Syd-

ney; *Diaspis baisduvali* on orchids, Manila; *Hemichionaspis aspidistrae* on rhodea japonica, Japan; *Lepidosaphes beckii* on nursery stock, Japan; *Lepidosaphes euryae* on camelia, Japan; *Lepidosaphes uniloba* on rhodea japonica, Japan; *Leucaspis japonica* on maple tree, Japan; *Pinnaspis* species on oranges, Fiji; *Pulvinaria psidii* on maple tree, Japan; *Pseudococcus pinii* on juniper tree, Japan; *Pseudococcus azelae* on maple tree, Japan; *Pseudococcus* species on pineapple, Manila; *Parlatonia pergandii* on maple tree, Japan.

LEPIDOTERA—*Angumsis* grain moth on corn, Louisiana, U. S. A.; *Cnidocampus flavescens* on fruit trees, Japan; *Clisiocampa* species (tent caterpillar) on fruit trees, Japan; Bag worm (three species), on tea plant, loquat, pine tree, Japan; *Lycaenid* butterfly on orchids, Manila; *Poralipea modesta* on rice, Japan; *Parasa* species on maple tree, Japan; *Plodia interpunctella* on beans, Japan; *Porthetria dispar* (Gypsy moth) on plants, Japan; *Pyralis farinalis* on rice, Japan; *Tineid* leaf miner on citrus plants, Japan; *Tortrix* miner on ornamental plants, Japan; *Thysiodopteryx* species on camelia plants, Japan; *Thysiodopterix* species on *thuya orientalis*, Japan.

DIPTERA—*Phorbia brarsicae* on turnips, U. S. A.; *Syrphid* species on orchids, Manila; *Tipulid* on soil, Japan; *Phorid* on soil, Japan.

COLEOPTERA—*Actheopeus aterrimus* on orchids, Manila; *Adoretus* species in soil, Japan; *Balandinus rectus* in chestnuts, Eastern U. S.; *Balandinus probosideus* in chestnuts, Eastern U. S.; *Bruchus prosopis* in mesquito pods, Mexico; *Calandra grancria* in corn, U. S. A.; *Calandra oryzae* in rice, Japan; *Calandra linearis* in rice, Japan; *Calandra* species in quercus seed, Formosa; *Carabid* on orchids, Manila; *Cryptorhynchus* species on brownea seeds, Java; *Cylosformicarius* on sweet potatoes, Hongkong; *Elaterid* larvae on orchids, Manila; *Melolontha* species in soil, Japan; *Scolytid* on Brownea seeds, Java; *Scarabaeid* in soil, Japan; *Staphylinid* in soil, Japan; *Tenebrioides mauritonicus* on rice, Japan; *Tribolium ferrugineum* in rice, Japan.

HYMENOPTERA—*Formica nigra* on artichoke flowers, San Francisco; *Lasius interjectus* in soil on roots of plants, Japan; *Polyhachis dives* on plants, Japan; *Strumigenys lervisi* on tea plant, Japan; *Lasius niger* in soil, Japan; *Cremostogaster sordidula* on pineapple, Manila; *Dolichoderus bituberculatus* on orchids, Manila.

MISCELLANEOUS—*Cladosporium citri* on citrus plants, Japan; Brown velvet lichen on maple and cherry trees, Japan.

RECAPITULATION OF INSPECTION WORK.

| | | |
|---|------------|------------|
| Vessels inspected, Honolulu..... | 380 | |
| Vessels found carrying vegetable matter, Honolulu.. | | 216 |
| Vessels inspected, Hilo..... | 87 | |
| Vessels found carrying vegetable matter, Hilo..... | | 40 |
| | <u>467</u> | <u>256</u> |

| | | |
|--|---------------|------------------|
| <i>Disposal of Shipments—Honolulu.</i> | <i>Lots.</i> | <i>Packages.</i> |
| Passed as free from pests..... | 10,640 | 179,507 |
| Burned | 367 | 1,000 |
| Returned | 5 | 26 |
| Fumigated | 145 | 1,464 |
| | <u>11,157</u> | <u>181,997</u> |

| | | |
|------------------------------------|--------------|------------------|
| <i>Disposal of Shipments—Hilo.</i> | <i>Lots.</i> | <i>Packages.</i> |
| Passed as free from pests..... | | 21,795 |
| Burned | | 45 |
| Returned | | 12 |
| Fumigated | 1,478 | 210 |

| | | |
|-----------------------|---------------|----------------|
| Grand Total | <u>12,635</u> | <u>204,059</u> |
|-----------------------|---------------|----------------|

| | | |
|--------------------------------------|---------|---------|
| Fruits and vegetables inspected..... | 200,487 | |
| Plants inspected | 955 | |
| Seeds inspected | 2,617 | 204,059 |

RICE SHIPMENTS.

| | | |
|-------------------------------------|--------------|---------|
| Passed as free from pests..... | 252,357 bags | |
| Fumigated on account of weevil..... | 8,467 " | 260,824 |
| Corn fumigated | 552 bags | |
| Beans fumigated | 900 " | 1,452 |

INTER-ISLAND INSPECTION.

For six months—July 1 to December 31, 1911.

| | |
|---|------------|
| Steamers attended | 314 |
| Packages of fruits, vegetables and plants passed..... | 3,132 |
| Packages of fruits, vegetables and plants refused shipment. | <u>590</u> |
| Total packages inspected | 3,722 |

DIVISION OF ANIMAL INDUSTRY.

Preliminary Report of the Territorial Veterinarian for the Calendar Year 1910-1911.

Honolulu, May 31, 1912.

Hon. W. M. Giffard, President and Executive Officer and the
Board of Commissioners of Agriculture and Forestry,
Territory of Hawaii.

Gentlemen:

LIVE STOCK CONDITIONS IN GENERAL.

The past year has proved an exceedingly gratifying one in so far as live stock sanitary matters are concerned. With the exception of a couple of the smaller islands (Lanai and Niihau) conditions have been everything that could be desired for the furtherance and profitable development of the live stock industry. While the heavy influx of military men has necessitated the importation from the mainland of large quantities of meat, there can be no doubt that, under normal circumstances, the Territory would have been more than able to supply the local demand for all classes of meats, except possibly poultry, and there is every prospect that the modern methods adopted by the leading ranches, of utilizing only the highest class of pure bred breeding animals, will double the output of either beef, mutton or pork and enable the local interests to supply the demands of even this inflated meat-consuming population, at prices which of necessity must be profitable, owing to the distance from the nearest available market, and to the fact that grass fed and finished beef and mutton of unexcelled quality, can be produced here without resort to the use of concentrated feeds (grain, corn). Climatic conditions have been favorable and, as stated, the ranches which, a few years ago, foresaw the coming demand and prepared for it by the importation of high class breeding animals are now harvesting the reward of their enterprise. The value of a finished carcass of beef has practically doubled, considering the earlier maturity, the increased percentage of valuable cuts as compared to waste and the rise in price resulting from demand. When to this is added the reduction in cost of production and marketing which is bound to result from coöperation, as well as from competition, there can be no doubt that Hawaii will hold its own as a meat market for the local demand.

Pork, of which large quantities are consumed, especially by the oriental population, is now being supplied entirely from local sources. A few years ago there were imported annually from 6,000 to 8,000 live butcher hogs, while at the present time and for more than two years past not a single hog, and comparatively little refrigerated pork, has been brought here from the outside.

Poultry, eggs and dairy products, however, remain far behind where the question is of local supply. Practically all milk is consumed as such, and what little butter is produced rarely reaches the market. No more ideal climatic conditions could be found for poultry raising, and the demand for eggs and chickens is enormous and still there does not, to my knowledge, exist a single poultry farm worth the name in the islands. Diseases of poultry are few and easily controlled and the vexing question of housing is a negligible one here. Nevertheless, I have seen experienced poultry raisers with money to invest return to the mainland after spending weeks in vain searching for a suitable location for a chicken ranch, either as homesteaders, lessees or purchasers.

DISEASES OF LIVE STOCK.

The past year has been practically devoid of any serious outbreak of either infectious or contagious diseases among live stock, while parasitic diseases have continued to decrease with improved methods in handling and caring for the animals. Glanders among horse stock seems practically to have disappeared since the continued introduction of the infection with imported animals has been stopped by means of inspection, testing and quarantine. Here again, the climatic conditions undoubtedly have been of great value as there can be no doubt that many cases recover, temporarily at least, and some perhaps permanently. The total absence of closed or ill ventilated stables is the most important factor in the natural decrease of this scourge. Next to this the constant vigilance of the deputy territorial veterinarians who sooner or later are sure to locate even cases which are deliberately being hidden, in connection with the increased knowledge of the dangerous nature of the disease, have done much to cause either the destruction or at least the isolation, whether clandestine or not, of suspicious cases. To this must be added the effect of the law enacted by the last legislature making it a misdemeanor to sell or dispose of an animal affected with or suspected of having glanders and making the vendor responsible for any damages or loss resulting from such a transaction. The immense advance in the prices of horses and mules has likewise had a tendency toward the prolongation of life of all work animals through increased efforts on the part of owners and employees in protecting them from exposure to infection, and not the least direct result thereof is the elimination of the public watering trough or the indiscriminate watering of horse stock at places where the nature of the supply is in the least doubtful. The dissemination of knowledge along these lines through the published reports of the Board has, possibly more than anything else, been responsible for this most remarkable decrease in a disease which in less favorably located countries, still remains at the head of the list of destructive diseases. But obviating further discussion as to which of

these contributing factors is the most important, the fact remains that glanders has practically disappeared or else is effectively hiding itself, and it is safe to conclude that so long as the source of supply of fresh infection remains at zero, so long as no fresh cases of glanders are allowed to enter the Territory from without—and we continue to pay the price, eternal vigilance—so long will we remain free from the disease. On the other hand, let us relax and listen to the arguments of those whose source of income is at all depending upon the number of animals they sell, commensurate to a great extent with the number of animals which die, and whose chief argument is, that no case of glanders has arrived here from without for the past four years, and that consequently the regulations pertaining to importation are obsolete and no longer required,—and I feel confident that it would be but a very short time before we would have the disease with us again. The pass has been reached where the purchaser of live stock on the mainland has only to mention the fact that he comes from Hawaii when the dishonest dealer disappears. Let us rescind our regulations in the least, and the old conditions, when Hawaii—being 2,000 miles away—was considered the safest dumping ground for reacting horses and cattle, would speedily come to life again.

What has been said above in regard to glanders among horse stock applies with almost equal force to tuberculosis of cattle. The climatic conditions, allowing of open stables the year around, are entirely in favor of the eradication of the disease. Many cases undoubtedly make a temporary or apparent recovery, and only a small percentage ever reach the fatal termination, except when accompanied by advanced age. The regulations of the Board pertaining to the inspection and testing of cattle intended for importation, have effectively put an end to the further introduction of the disease from without. The eradication of the disease from the local herds has constituted the main work of this division for the past three years. A splendid spirit of coöperation, coupled with unexcelled willingness to sacrifice the affected animals, have characterized the campaign against the disease, making it possible to practically eradicate it from the City and County of Honolulu, without using either coercive measure or compensating the owners of diseased animals, even partly, for their losses. The same educational measures, the regular publication of monthly reports on the work of the division, has created a tendency on the part of milk consumers to demand clean milk, this is, milk originating on premises where no diseased (reacting) animals are kept, and where the milk is drawn and handled under sanitary conditions. In this work this division has had the full assistance of the local Board of Supervisors as well as the co-operation of the Honolulu Dairymen's Association. The former, through the office of the county physician, delegated its milk inspector to assist the testing of more than 5,000 dairy animals,

while the latter installed the most modern electric milk purifying devices, and what is most important, refused to receive milk except from clean herds and sanitary premises. At the same time the local Board of Health, through its Pure Food Commissioner, coöperated by enforcing the requirements of the statutes pertaining to the official milk standards, with the result that the City of Honolulu may be said to have a milk supply second to none and equal to the best of any city of its size in the United States.

The adoption of the intradermal method of tuberculin testing has, so to speak, revolutionized the campaign of eradication of bovine tuberculosis, compelling, as it does, the confidence of the owners, and at the same time obviating the many inconveniences and objectionable features of the old subcutaneous method. The fact that an owner can see for himself whether an animal reacts or not, that he no longer has to blindly accept the word of the inspector—frequently in doubt himself as to whether the temperature record spells positive or negative—has by one stroke done away with ninety per cent. of the old objections to having the animal tested, and when a majority of the consumers demand of the producer to know whether the cows have been treated and whether any of the reactors are left on the premises before leaving an order for milk to be delivered at his home, then the moral effect becomes binding, and the result comes very close to one hundred per cent. of "clean" dairies, as is now the case in Honolulu. It is the aim of this division to extend the work of eradication of bovine tuberculosis to the entire group, and if the same spirit is found to prevail on the other Islands as on Oahu, the end is in view. With the assistance of the Deputy Territorial Veterinarians on the other islands, who must be remunerated for the time given to the work, and with the necessary funds for traveling expenses for an inspector and an assistant sent out from this office, with an automobile, it is anticipated that a sufficient number of milk producers will be found willing to have their herds cleaned up, to compel the balance to either follow suit or go out of the business.

The only disease which has at all caused any alarm during the past year is *cerebro spinal meningitis* among horses and mules. Outbreaks of this have occurred on all four of the principal islands, but especially on Maui. In accordance with the latest views on the subject the disease must be classified as a *toxæmia*, due to the assimilation of musty or mouldy feed, rather than as an infectious disease. The condition cannot be transmitted from animal to animal, even by direct inoculation, and can always be controlled when it is possible to locate the existing cause, which is generally found to be musty grain or possibly water found to be contaminated by decomposing vegetable matter. A rather severe outbreak of this disease was investigated during the past year, and an attempt to stop it was made by applying Pasteur filters to the water pipes supplying the stables where the affected ani-

imals had contracted the disease. Owing to a considerable amount of sediment in the water the filters soon became clogged, and the experiment had to be abandoned. The principle, however, is no doubt correct and if the mechanical difficulties could be surmounted the disease could most likely be controlled or prevented by means of the filters. These would at the same time remove the eggs and embryos of intestinal parasites which, I am inclined to believe, always play a certain part where nervous symptoms appear endemically among horse stock.

Rabies in Dogs. During the latter part of the last calendar year the attention of the Board was called to the fact that rabies among dogs was quite prevalent in certain parts of California, and so long as this Territory was practically unprotected against an invasion of the disease, instructions were issued from this division to prepare a regulation for the purpose of preventing it from gaining entrance here. A thorough investigation of the subject proved that preventive measures were urgently needed, and while the resulting regulation did not go into effect until March 1st of the present year, it was considered well to mention the matter in this report so long as subsequent developments have caused the establishment of a four months' quarantine against dogs, and made the enforcement of the same one of the most important branches of work of this division.

By inquiry through official channels it has been learned that the present outbreak of rabies in California alone has already demanded a toll of not less than nine human lives from hydrophobia, while hundreds (officially reported cases) of dogs and other domestic animals have succumbed to rabies or have been destroyed after being exposed to the disease through bites inflicted by infected animals. The seriousness of the situation is best realized by stating that it has become necessary to establish not less than eight official stations for administering the Pasteur treatment to persons bitten by rabid dogs, in California alone, and that similar measures have been, or are being taken by neighboring states.

This Territory has, as stated, protected itself by the enforcement of a rigid quarantine against all dogs coming from or through countries where the disease is known to exist, and by a campaign of eradication of ownerless dogs within the Territory. As there can be little doubt that the entrance of the disease into this Territory, in its present unprepared state, would prove nothing short of a calamity, it is to be hoped that the measures now in force will prove effective, until such time as the respective authorities shall be able to cope with it and be prepared to protect human life as well as that of dogs and other domestic animals as is now being done by this Board. To postpone the preparation for administering the Pasteur treatment, until the disease is actually here, would seem somewhat risky in view of the distance we are removed from the nearest place where it can now be obtained, and it is therefore urgently recommended that steps be taken

without delay for the establishment of a Pasteur laboratory in Honolulu.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

FRUIT FLY CAMPAIGN.

Honolulu, August 1, 1912.

To the Commissioners of the Board of Agriculture and Forestry.

Gentlemen:—I am pleased to report that during the past two months (June and July) there has been a gradual but marked improvement in the condition of infestation throughout the area of Honolulu covered by existing regulations. The same may be said, in a measure, of portions of outside but adjacent territory. In the latter instance the apparently improved condition may to some extent be due to the few wild guava at present in fruit, although the mountain apples in the valleys, which are now in season, show very little, if any, infestation at all. The improvement in Honolulu gardens is undoubtedly due in part to a better and more general coöperation on the part of householders, who are now taking more interest in the work of the campaign and particularly in the proper disposition of their fallen fruit. Very much better results would be obtained if the whole community combined in an every day "clean up" and the City and County government could be prevailed upon to adopt the daily free garbage throughout the city and suburbs, which I have strenuously advocated since the beginning of the campaign. Credit, however, should be given the County Supervisors for having co-operated in our campaign work to the extent that the incinerator was again placed in commission at the service of the public after having been closed down during a long period. Had it not been for the effective destruction of the large quantities of fruits taken to the incinerator by the Garbage Department and the additional service of special outside transportation arranged for by the Board of Agriculture, the outcome of the campaign at this time would have been obviously different. As it is, there is, as already stated, room for much improvement in the garbage transportation system, which, however, can hardly be remedied until this is made free to all.

Since my last report a special corps of inspectors under the immediate supervision of Mr. Weinland have continued spraying with "Mally's" arsenate of lead solution areas of fruit trees in local gardens. During the past two months the spray gang has covered the districts four times, which is as much as the limited

appropriation has thus far permitted. For reasons explained in previous reports, it was found impracticable to undertake systematic spraying with poisoned bait solution in conjunction with that of "clean culture" until the Territory was reasonably assured of financial assistance from Congress. This combination method of combating the pest, other than on experimental lines, was therefore not possible until last May, at which time assurances were received that the Congressional appropriation asked for would probably be granted. Unfortunately circumstances of a political nature at Washington, D. C., have temporarily stalled several of the large appropriation bills now before Congress, in one of which our item is included. It is expected, however, that these bills will have favorable attention before adjournment of Congress during August. In the meantime the departure from Washington of the representative (Dr. Back) of the U. S. Bureau of Entomology has been indefinitely postponed. Advice received by me from the Chief of the Bureau state that Dr. Black will leave just as soon as Congress finally passes the appropriation bills referred to.

Many complaints have been made regarding the peculiar condition affecting a very large percentage of mango fruits this season. In the earlier part of the season it was supposed that this condition, which is one of decay whilst on the tree, was due to attack of the Mediterranean fruit fly. It soon became apparent that this latter part had nothing whatever to do with the matter nor was this particular form of rottenness caused by a fungus disease, as originally suspected. Special breeding experiments with this class of rotted fruit were undertaken in the laboratory, the result being that no fruit fly was bred from same, but in every such case it has been found that the seed was attacked by the mango weevil, which, it appears, is exceedingly prevalent throughout Honolulu this season. The attack of the weevil in the fruit undoubtedly brings about fermentation and the subsequent rottenness complained of. These facts have been corroborated by the U. S. Experimental Station, to the Director of which my thanks are due for courtesies rendered.

The insular conditions of infestation remain the same, Hilo, Puna and Kau on the Island of Hawaii being the only districts in which the fruit fly has not yet been observed. From personal observations, as well as from information received, I am led to believe that the inspection conducted by our island neighbors on the arrival of steamers from infested ports has not been as efficient as it should have been if it was intended to keep the pest out. There are, however, reasonable excuses to offer for such a state of affairs, the principal ones being the lack of funds to pay a sufficient force of efficient inspectors at the many terminal and way ports touched by our inter-island steamers and the absence of necessary legislation making it legally possible to search the passenger and his baggage when embarking on or disembarking from

inter-island steamers without a search warrant. It has been previously mentioned that all such inspection must, as a result, be perfunctory. Many of the districts have contributed financially and otherwise with a view to employing inspectors, for their special sections of territory, but not to a sufficient extent to ensure the appointment of special men for the important work required. Even at this moment the district of Hilo has practically thrown up its hands and the inspection work at its main port is not now being carried out as efficiently as it should be because of the alleged impossibility of controlling the thoroughfares leading into that district from Hamakua, where the pest has already been admitted by means of either the Kohala belt road or through one of the Hamakua ports. It is, therefore, quite natural to suppose that in a very short time the fruit fly will be found throughout Hilo and it will then only be a matter of a few months before it passes through Puna into the Kau district. The last named section is well guarded on the Hilo side by a locked gate on the belt road at Kapapala, but the Kona side, I am informed, is not so well cared for and as Kona is infested throughout, it will be an easy matter unless the greatest care is taken, for the pest to pass into Kau by means of infested fruit on the person or in the baggage of any passengers entering the latter section by that end of the belt road. The same arguments apply to the landings of Punaluu and Honuapo, in Kau, which are the calling ports of steamers bringing freight and passengers from other infested islands or districts. In my opinion the only successful inter-island inspection and method of control on the adjacent islands would have been such as Federal officers would have been most likely to pursue under U. S. laws. It is well admitted that officers of the Federal government, backed by a sufficiently large appropriation, can better handle the traveling public and the inspection of their baggage, as well as that of general freight, at ports of disembarkation in this insular territory than can the territorial or county officials. The Federal officer will take but little notice of inconvenience or delays occurring because of any necessary inspection he has to perform in his line of duty and furthermore he is not so subject to influence and unjust criticism as our insular officials.

The latest information from Dr. Silvestri is that he is now well on his way to the section of Africa where he hopes to meet with a measure of success in his search for an effective parasite on the Mediterranean fruit fly and Cotton Boll worm. Arrangements were made through Governor Frear and the State Department at Washington so that Dr. Silvestri might receive credentials from and the backing of the several European nations in control of sections of the African continent where the explorer is liable to meet with difficulties of one kind or another unless armed with the proper official authority.

For reasons previously explained, it has become necessary to

modify the existing regulations of quarantine on certain fruits and vegetables which it may be necessary to transport from one infested island or district to another.

The Board recognizing this fact submitted a request to the Governor to amend Regulations X, XIV and XV pertaining to the sanitary horticultural conditions in Honolulu, Hawaii and Maui. Final action has been temporarily delayed due to the fact that it is the desire of the administration to embody the above three regulations into one, which, under present conditions as to infestation, will now better answer the purpose of the Board.

Respectfully submitted,

W. M. GIFFARD,
Director, Fruit Fly Campaign, T. H.

DIVISION OF ANIMAL INDUSTRY.

REPORT FOR JUNE.

Hon. W. M. Giffard, President and Executive Officer,
Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of June, as follows:

Tuberculosis Control Work.—A comparatively small number of cattle have been tested during the month, the prolonged drouth having made it impossible to finish this important undertaking. There still remain about 2000 head of cattle, all range stock, to be tested and with the coming of the bean season, which promises an unusually heavy crop, it is expected that the remaining herds can be gathered and tested. In the meantime all reacting animals have been removed from the dairy herds and the milk supply of the city can safely be pronounced free from tuberculosis infection.

Importation, Inspection and Quarantine.—As will be seen from the detail report hereto appended, a large number of live stock, especially horses and mules, arrived from the mainland, one steamer alone bringing 136 head. Fortunately most of the horse stock came from the Central and Northwestern States and were shipped via Portland; otherwise it is doubtful whether the Quarantine Station would have been large enough to accommodate them all. A considerable number of brood mares, destined for Maui, were allowed to finish their quarantine period on that island under the supervision of the local representative of this office. With the exception of a few cases of influenza and shipping fever, all the animals arrived in good condition.

The congested state of the dog quarantine division was relieved

on the 19th of the month by the discharge of the 16 performing dogs mentioned in my last report and which it had become necessary to furnish quarters for while awaiting the departure of their steamer.

There are at the present time 17 dogs in quarantine, but a number of these, the first arrivals after the rabies regulation went into effect, will be released during the month of July.

The 16 dogs in quarantine at Schofield Barracks have been visited regularly, at least once a week, and do not seem to suffer any from their confinement. This is undoubtedly due to the elevation and the much lower temperature which they enjoy at Leilehua as compared to our station on the Beach Road.

The construction of six additional kennels with twelve houses was finished by the middle of the month and there now only remains the building of a concrete tank for the use of spaniels and other long-haired dogs which suffer much from the heat unless they have frequent access to a pool of water. Such a concrete tank with the required plumbing and with a corrugated iron roof over is estimated to cost \$116—(Oss) and will, I believe, add materially to the welfare of the animals during their prolonged detention, besides demonstrating to the owners that everything reasonable is being done for their pets. For these reasons I consider this tank a necessity and would respectfully ask the Board to allow the estimated sum for its construction. In case of favorable action there will still remain an unexpended balance of \$200 from the sum at first recommended as necessary for the completion of the Dog Quarantine Station.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT FOR JULY.

Honolulu, August 1, 1912.

Hon. W. M. Giffard, President, Board of Agriculture and Forestry.

Sir:—I beg to submit herewith a report on the work of the Division of Animal Industry for the month of July, 1912.

IMPORTATION, INSPECTION AND QUARANTINE.

An unusually large number of domestic animals of various classes and breeds have arrived during the past month. Of work animals, nearly one hundred head arrived, mostly mules, and all of superior quality. Of this number 75 are now in quarantine where they will remain until the 14th inst. At the Hilo Quarantine Station there are now 32 mules, which are to be released

on the 10th inst. This fact is mentioned because the Deputy Territorial Veterinarian from Hilo, Dr. Elliot, is in the Queen's Hospital here, having been operated on for appendicitis, and in case he does not recover in time it will be necessary to send an inspector from this office in order to pass on and release these animals.

Of breeding stock, there arrived four large jacks, which go to the Parker Ranch for mule breeding. This ranch has, during the past four years, endeavored to produce mares of sufficient size to raise large mules from, and there is every indication that before long a large percentage of the mules, which are now being imported here annually, will be raised in the Territory. By the exclusive use of large imported stallions, principally Percherons and German Coach, the above mentioned ranch has succeeded in developing both the size and the quality of its brood mares, several hundred of which will now be bred to the imported jacks, thereby adding an immensely important branch to the live stock industry of the Territory.

By reference to the annual reports of this division for the past six years, it will be seen that every effort has been made to get the stock breeders here to take up mule breeding and it is therefore highly gratifying to see that the end is finally in view. Both feed and climate are ideal for the purpose in many localities here, especially in the mountain pastures on Hawaii, Maui and Molokai, and it now only remains to be demonstrated if mules that are raised here will possess the same amount of stamina, that is, energy and endurance, as the imported mules, and there is every reason to believe that such will be the case.

Another importation of equal importance and undertaken by the same ranch was the arrival a few days ago of a number of the very finest Hereford heifers, which will form the nucleus of a breeding herd which, with the blue ribbon bulls which already have arrived, will rival any breeding herd in the United States. Too much credit cannot be given to the management of this large ranch, which supplies more than 90 per cent. of all the beef consumed in Honolulu, for the excellent quality of this most important food product which is now constantly available here, besides which these importations of the Parker Ranch have made it possible for less favorably situated cattle breeders to obtain high class breeding animals without having to send away for them. In this way the entire Territory is benefited and it is safe to predict that before long the erstwhile long-horned and long-legged range cattle will be a thing of the past in these islands.

In absolute contrast to the above stands the local poultry industry. During the past month not less than 137 crates of live poultry arrived at this port alone, many of the crates holding five or six dozen birds each and nearly all of egg-laying breeds. This is one of the problems which has been repeatedly discussed in these reports but instead of getting better it seems that the im-

portations are constantly increasing. Vast quantities of cold storage eggs and butchered poultry are constantly arriving, and while the demand has increased greatly with the military invasion, the local supply seems to be diminishing instead of responding to it. In no previous month, not even at Thanksgiving or Christmas time, do I remember seeing such quantities of live poultry arriving here, and still I know of no more ideal conditions for poultry raising than those which obtain here, barring the cost of feed. But that one objection is easily offset by the prices which poultry and eggs command here. There are no diseases worth mentioning and costly housing is uncalled for, and still such a thing as a "Chicken Ranch" is unknown here.

During the past month there arrived ten dogs, of which number eight were permanent arrivals, while two only belonged to temporary visitors—theatrical performers—and which have already departed. Twenty-two dogs are now in quarantine and the station is practically full. Where sex and other conditions permit of it, more than one dog is placed in each kennel, but this can, as stated, be done only with animals which arrive at the same time or approximately so.

In connection with the dog quarantine, I beg to say that a great deal of the keeper's time is taken up with these animals, and that with more than one hundred head of large animals in the station, as at the present time, I have to ask the Board's permission, in case it becomes absolutely necessary, to temporarily employ a man to help the keeper out, for a week or two perhaps. With so many animals there are constant repairs to be made to fences and gates, while feeding, watering and hauling of manure consume a great deal of time, owing to the not inconsiderable distances that feed and manure must be hauled by means of a wheelbarrow, in heavy sand.

The dogs quarantined at Schofield Barracks have been visited regularly once a week, and all appear to be doing well so far. One of these, belonging to Capt. Apple, will be released today, while the other 15 will remain in quarantine until September 11th.

An application from Mr. Munro, of Lanai, for the admission of three dogs from New Zealand, without quarantine, is submitted for the consideration of the Board, with the recommendation that the same be granted if, upon arrival, the required certificates of health are found satisfactory.

TUBERCULOSIS CONTROL WORK.

It will be seen from the appended report of my assistant, several hundred head of cattle have been tested during the past month and all reacting animals have been branded and removed from the herds where found.

GLANDERS.

This disease has unfortunately made its appearance again, and under most annoying circumstances. At the request of the sheriff, a horse which had been found wandering in the streets until placed in the Kalihi pound was examined and was found to be suffering from typical glanders. Though the sheriff detailed two officers to try to locate the owner, they did not succeed, and the horse was shot. As the animal was suffering from a profuse discharge from the nose, it is to be feared that other animals may have become infected, but so long as the owner, who undoubtedly was aware of the animal's condition, could not be found, no further measures could be taken to prevent the spread of the disease.

A hitherto *unknown disease* has made its appearance in several local stables, a total of four cases having come under observation, one of which has died. The disease resembles tetanus or lockjaw to a certain extent, and may possibly prove to be a toxæmia, due to intestinal parasites. Unfortunately no opportunity to make a post mortem examination has presented itself, the one fatal case not being reported in time for this purpose.

RABIES.

A total of 191 ownerless and stray dogs have been caught and destroyed in the gas chamber in the jail yard.

From reports received from the health authorities of California and Oregon, it appears that rabies is spreading steadily and the Board's action in enforcing a strict quarantine against all dogs coming from or through infected countries would therefore seem fully justified.

Very respectfully,

VICTOR A. NØRGAARD,
Territorial Veterinarian.

REPORTS OF ASSISTANT VETERINARIAN.

Honolulu, June 30, 1912.

Dr. Victor A. Nørgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit herewith a report on the work accomplished during the past month.

TUBERCULOSIS CONTROL.

The work in this line has consisted of testing the new cattle taken into the different dairies. This amounted to a total of 55 head, scattered in eight different dairies, all of which passed the

test and were tagged in the usual manner. The large majority of these animals had been purchased in the district of Kona, Hawaii.

The following is a tabulated list of the dairies visited:

- June 3-5—
 Kamehameha Schools, 1 cow.
 L. Hernandez, 3 cows, 1 bull.
- June 21-24—
 M. Riedell, 1 cow.
 M. Kawamura, 3 cows.
- June 24-26—
 S. T. Allencastre, 1 cow.
 E. W. McGuire, 10 cows, 1 bull.
 T. Gouveira, 19 cows.
- June 25-27—
 M. Gomes, 14 cows, 1 bull.

EPIZOOTIC LYMPHANGITIS.

On June 14 my attention was called, by Dr. L. E. Case, to a mule in the Public Works stables which had a suspicious discharge from the nose.

In company with Dr. Case I made an examination of the animal, with the following description:

Mule; female; about 20 years old; was crippled to some extent by a fall on the knees. The animal had been losing flesh for some time and the knees were healing very slowly. There was a bi-lateral discharge from the nose and numerous ulcers upon the nasal septum; sub-maxillary glands slightly swollen.

I made no conclusive diagnosis but regarded the animal as showing symptoms approaching those of glanders and ordered its immediate removal to the Quarantine Station, there to be subjected to the Mallein test by Dr. L. E. Case. Dr. Case was further instructed to give the entire stables a careful and thorough disinfection, full particulars being given him as to the method, and all litter in the yards raked together and buried. The disinfecting took place under my supervision and the stables pronounced clean after a final inspection by Dr. Nørgaard and myself.

Upon seeing the mule at the Quarantine Station Dr. Nørgaard pronounced the case as one of Epizootic Lymphangitis and predicted the failure of the test to show a reaction, which diagnosis and prediction were substantiated by Dr. L. E. Case's report of no reaction from the Mallein test.

On June 17 the mule and a glandered horse belonging to P. M. Pond, which we had had at the station for some time and which had reacted to several methods of Mallein testing, were taken to the Channel wharf where they were shot and towed out to sea.

INSPECTION OF DOGS AT SCHOFIELD BARRACKS.

During the month of June four trips were taken to Schofield Barracks for the purpose of seeing if the rules and regulations of the Board, concerning the dog quarantine, were being carried out in the proper manner. Everything was found to be going O. K. and while the quarantine pens are not much to look at and loosely put together they seem to be holding the dogs all right at the present time, but if rabies should break out in any of them I hardly think that it would long resist the furious attacks which would be made upon it.

Importations of live stock at the port of Honolulu for the month of June:

- S. S. "Virginian," Seattle, June 3—
 45 mules, 19 horses—Q. M. Dept.
 22 mules, 50 horses—Chas. H. Bellina.
- S. S. "Lurline," San Francisco, June 5—
 2 horses—Major Cheatham.
 2 hogs—W. F. & Co.
 2 cats—Mr. Clark.
 9 crates poultry.
- S. S. "Sonoma," San Francisco, June 7—
 13 crates poultry.
- S. S. "Wilhelmina," San Francisco, June 11—
 4 crates poultry.
- S. S. "Manchuria," San Francisco, June 12—
 1 dog—Harold Castle; quarantined for 4 months.
- S. S. "Honolulan," San Francisco, June 19—
 3 Holstein bulls—Mr. Isenberg.
 14 mules, 10 mares—N. H. Churchill.
 2 hogs—W. F. & Co.
 13 crates poultry.
- S. S. "Ventura," San Francisco, June 27—
 1 dog (Boston bull)—Mr. Wood; quarantined for 4 months.
 5 crates poultry—M. Gonsalves.

Respectfully submitted,

LEONARD N. CASE,
 Assistant Territorial Veterinarian.

Honolulu, July 31, 1912.

Dr. Victor A. Nörsgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith a report of the routine work of this Division:

TUBERCULOSIS CONTROL.

The following dairies were visited and cattle tested:

1st to 3d—M. Gomes—6 cows, all passed.

1st to 3d—J. P. Mendonca—1 cow, passed.

11th to 13th—Isenberg—2 cows, passed.

23d to 25th—Isenberg—179 cows, 3 bulls; 163 passed, 19 condemned.

26th to 29th—Isenberg—134 cows, 4 bulls; 120 passed, 18 condemned.

All reactions were typical and unmistakable; all were well defined and three were large enough to be easily seen across the corral and were, in fact, the largest swellings which I have so far observed. They were oval in shape and were, as near as one could judge, $1\frac{1}{2}$ "x2" in size, firm to the touch but not hard, and exhibited no heat or pain, in fact, were typical reactions.

It has been a disputed point as whether or not more time should be allowed between the time of injection and the time of examination. The evidence gathered on this point during this last test practically settles the question in favor of a period of 72 hours elapsing before the examination is made.

In the bunch of 138 head seventy-two hours were allowed to elapse before an examination was made. On the forty-eighth hour the foreman of the ranch made a very careful examination and picked out fifteen reactors, the remaining ones, he declared, gave no evidence of a swelling of any description. When I made my examination, twenty-four hours later, I picked out eighteen which gave typical reactions. His fifteen corresponded with fifteen which I had declared tuberculous and I had found three more which he was emphatic in declaring had shown no indications of reacting on the forty-eighth hour. Thus the importance of the extra twenty-four hours.

Without doubt the majority of tuberculous animals can be picked out at the end of forty-eight hours, but as has been demonstrated there will be in some instances a few which will not show the characteristic reaction until a later time which makes it a necessity to wait seventy-two hours before making a final examination. By doing so nothing is lost and everything gained, a reactor cannot become lost as the swelling remains five or six days, but the entire test may be rendered useless if sufficient time is not allowed for its proper working.

GLANDERS.

Glanders has again made its appearance in, to all intents and purposes, an ownerless horse which had escaped from pasture and brought to the Kalihi Pound. This animal gave typical symptoms of glanders, there being a bilateral discharge from the nose, ulcers on the nasal septum and swollen sub-maxillary glands.

The animal was held in the pound for a few days in a vain attempt to discover the owner and while there was used for experiment in testing the accuracy of an intro-dermal Mallein test which I have had under consideration for some time, a test based upon the intra-dermal tuberculin test and designed to facilitate the testing of horse stock in the detecting and eradication of glanders. The details of this experiment and the test in general will be taken up in a future report.

The following is the list of importations of live stock at the port of Honolulu during the past month:

- S. S. "Hyades," Seattle, July 2
 - 22 mules, 2 horses—G. Schuman.
 - 18 horses—J. H. Wilson.
- S. S. "Lurline," San Francisco, July 3—
 - 3 polo ponies—Alexander & Baldwin.
 - 1 cat—Miss B. B. Cox.
 - 53 crates poultry.
- S. S. "Manchuria," San Francisco, July 4—
 - 1 crate white rats.
- S. S. "Wilhelmina," San Francisco, July 9—
 - 16 crates poultry.
 - 1 dog—Mrs. Bodrere—quarantined for 4 months.
 - 1 dog—Raymond Teal—quarantined for 4 months.
- S. S. "Shinyo Maru," Yokohama, July 15—
 - 2 dogs, 1 crate geese, 1 cat, 2 goats, 2 monkeys, 2 crates poultry, 1 parrot—Maurice G. Raymond.
 - 3 crates Japanese games—K. Ohashi.
- S. S. "Honolulan," San Francisco, July 17—
 - 6 horses, 1 crate chix, 1 colt—M. Ferreira.
 - 1 colt.
 - 1 Duroc-Jersey boar—Mr. Isenberg.
 - 2 dogs—W. F. & Co.—quarantined for 4 months.
- S. S. "Zealandia," Vancouver, July 17—
 - 3 dogs—Dr. James Judd—quarantined for 4 months.
- S. S. "Siberia," San Francisco, July 22—
 - 1 horse—Rosenberg Tank Co.
 - 12 crates poultry.
- S. S. "Hilonian," Seattle, July 22—
 - 30 Shropshire rams—A. W. Carter.

These rams were taken to the Quarantine Station where they were thoroughly dipped in a chloro-naphtholeum bath and sheared before they started on their trip to Hawaii.

Schooner "Hackfeld," Germany, July 24—

- 1 dog—W. R. Shingle.

Was not subjected to quarantine as the required time of 120 days had been spent in transit, that is, 119 days were required to make the trip and the last day was spent on board ship at the dock.

S. S. "Lurline," San Francisco, July 31—

- 4 mules—City Mill Co.
- 30 " —Schuman Carriage Co.
- 34 " —Club Stables.
- 3 horses—Club Stables.
- 4 jacks—A. W. Carter.
- 10 cows—A. W. Carter (Hereford heifers).
- 1 bull—A. W. Carter (Hereford).
- 1 horse—W. F. & Co.
- 23 crates poultry.
- 3 crates hogs (Berkshire)—W. F. & Co.
- 3 monkeys.
- 3 crates pigeons.

The heifers and bull are now at the Quarantine Station where they will rest from their long journey. They will be carefully watched and tended to and finally sprayed with a disinfectant.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF FORESTRY.

REPORT FOR JUNE.

Honolulu, July 8, 1912.

Board of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for June, 1912:

My own time during June, outside of routine work, was largely given to the preparation of reports on several forest matters and to getting ready for the use of the members of the Board data in connection with the beginning of a new fiscal period.

Under the date of June 13, I submitted to the Committee on Forestry a detailed report upon the condition of the forest in the Kau Forest Reserve, Hawaii, the result of an examination made in May. Other reports, upon forest reserve projects, await only the completion of technical descriptions of boundary.

The revival of active interest in street tree planting in Honolulu, together with the usual number of calls for advice from persons wishing to know how best to plant or care for the trees and shrubs on their grounds, kept the Forest Nurseryman busy during June. The plant distribution for this month, while not heavy in point of numbers, was made up of a fairly large number of orders, from various parts of the Territory. This part of the

work of the Division of Forestry is not very much in evidence, but in the course of a year it benefits a good many people. As usual, Mr. Haughs' report for the month is transmitted herewith.

At the end of June the collections of botanical material belonging to the Board of Agriculture and Forestry, with the cases in which they are housed, were transferred from the office of the Board to the new building of the College of Hawaii in Manoa Valley. The custody of the herbarium is turned over to the College of Hawaii as a loan, on the condition that the specimens shall be properly cared for and made available for use. This transfer of material marks the close of the active participation of the Board of Agriculture and Forestry in the botanical survey of the Territory, but Mr. J. F. Rock will continue to serve on the Board staff as Consulting Botanist. Incidentally it may be noted that good progress is being made on Mr. Rock's book, "The Native Trees of Hawaii," which is based on the material collected by him while exclusively in the employ of the Board of Agriculture and Forestry.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT FOR JULY.

Honolulu, August 1, 1912.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of July, 1912:

During this month my own time has been divided between work in the field and in the office. I have made several inspection trips to various forest areas on the Island of Oahu, more particularly to government lands in Palolo, Lualualei and Waianae Valleys, and at Pupukea, as well as to privately-owned forest back of Waialua, Waianae and Kahuku in the well-being of which the government has an interest.

Toward the end of the month the Government Survey Office completed the technical descriptions of boundary of several forest reserve projects that had for some time been on the waiting list. This permitted the completion of my reports on these proposed reserves, which are now in the hands of the Board, or being typed for transmission.

TREE PLANTING.

During the month a number of corporations and individuals have given advance notice of their desire to secure seedling trees for planting out next winter. It is desirable that such applica-

tions be filed early, that there may be no delay in getting the plant material when the proper planting season arrives.

FOREST FIRES.

On June 26th a grass and brush fire occurred on the lot owned by Mr. Norman Campion in Palolo Valley. It is thought to have been started by children playing with matches. Fortunately the fire was put out by men living on adjoining lots before it reached the houses on the lot, or got away up the slope.

On July 20 and 21 a grass fire was reported from the lower slopes of the Koolau range near Wahiawa. Mr. W. M. Templeton, the local fire warden, states that it was controlled before doing serious damage. This fire was fought by cavalymen from Schofield Barracks. Another fire in the same district, this time at the end of the Waianae range, is reported as having burned over an area of grass land below the point called Maili, on the evening of July 27th. This fire was also fought by soldiers from Schofield Barracks.

Beyond knowing that the district fire warden secured men to fight them, I have not yet got the details in regard to these fires.

With the continued drought in so many parts of the Territory it is incumbent upon all persons who have occasion to burn brush, or to make other fires in the open, to exercise unusual precautions not to let the fire get beyond control. In a dry time one cannot be too careful.

MR. HAUGHS' REPORT.

Following the usual custom, the report of the Forest Nurseryman, giving the details of that phase of the Division of Forestry's work, is submitted herewith.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

FOREST NURSERYMAN'S REPORTS.

Honolulu, July 1, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of June:

Nursery—Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|------------------|-------------------|---------------------------|---------------|-------------|
| Sold | | 50 | 360 | 410 |
| Gratis | 2,000 | 368 | 847 | 3,215 |
| | <hr/> 2,000 | <hr/> 418 | <hr/> 1,207 | <hr/> 3,625 |

Collections.

Collections on account of plants sold amounted to \$18.85.

Plantation Companies and Other Corporations.

From stock raised with labor supplied by plantation companies and other corporations we have received orders and supplied the following plants: 2,000 transplants in boxes and 300 pot grown.

Collecting Seed.

The two seed boys have been collecting around the city. The *Grevillea robusta* is now in season and considerable time will be required to get a sufficient quantity of this seed.

Experiment Garden, Makiki.

The two men have been transplanting and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The man employed for the purpose of taking care of the trees has been hoeing and clearing away grass.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

Honolulu, July 31, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the principal work done during the month of July:

Nursery—Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|------------------|-------------------|---------------------------|---------------|--------------|
| Sold | | 50 | 208 | 258 |
| Gratis | 11,250 | 350 | 766 | 12,366 |
| | <hr/> 11,250 | <hr/> 400 | <hr/> 974 | <hr/> 12,624 |

Collections.

Collections on account of plants sold amounted to \$10.80.

Plantation Companies and Other Corporations.

700 pot grown and 500 plants in transplant boxes have been distributed. An order for 12,000 Ironwood in transplant boxes to be delivered ready to set out in November has been received. We are now getting the trees to fill this order transplanted at the Makiki Station.

Seed Collecting.

The two seed boys have been collecting *Grevillea robusta* and other seed around the city, also assisting in packing up trees and transplanting on occasions when orders require to be filled in a hurry.

Experiment Garden, Makiki.

Building up a stock for the fall planting, also attending to the plants belonging to the different corporations, constitute the principal work done.

U. S. Experimental Planting, Nuuanu Valley.

For several months the want of moisture has kept us from finishing the planting of a few of the plots. We have at the Makiki Station plants for this purpose ready to set out and we intend to plant them when the ground becomes moist enough.

Respectfully submitted,

DAVID HAUGHES,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

REPORT FOR JUNE.

Honolulu, June 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of June as follows:

During this month there arrived 32 vessels of which 19 carried vegetable matter. The usual careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 793 | 12,972 |
| Fumigated | 9 | 179 |
| Burned | 29 | 89 |
| | <hr/> | <hr/> |
| Total inspected | 8311 | 13,240 |

Rice Shipments.

24,672 bags of rice arrived from Japan during the month of June and were passed as free from pests, after careful examination.

Pests Intercepted.

36 packages of fruit and 31 packages of vegetables were confiscated from passengers and immigrants during the month. Much of this material was found infested. Several shipments of plants arrived from Manila on which were found ants, millipeds, cockroaches and scale insects. 21 boxes of peaches from California were infested with the peach moth (*Anarsia lineatella*) and were destroyed by burning in the incinerator.

Hilo Inspection.

Brother M. Newell reports the arrival of six vessels, 4 of which carried vegetable matter consisting of 127 lots and 1,757 packages which were passed as free from pests, except one package of plants which was infested with mites and maggots and was destroyed.

Inter-Island Inspection.

During the month of June 58 steamers were attended to and the following shipments were passed on:

410 bags of taro,
11 bags cocoanuts,
45 packages of various plants.

Total 466 packages inspected and passed.

The following packages were refused shipment:

| | |
|-----|-----------------------------|
| 175 | packages of various fruits, |
| 21 | “ vegetables, |
| 8 | “ plants. |

Total 204 packages inspected and refused shipment.

Among the fruit 3 packages of mangoes were found infested with the maggots of the fruit fly.

Respectfully yours,

E. M. EHRHORN,
Superintendent of Entomology.

REPORT FOR JULY.

Honolulu, July 31, 1912.

Hon. Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of July as follows:

During the month there arrived 38 vessels of which 23 carried vegetable matter. The usual careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 1,054 | 19,850 |
| Fumigated | 8 | 18 |
| Burned | 27 | 60 |
| Total inspected | 1,089 | 19,928 |

Rice Shipments.

29,648 bags of rice arrived from Japan during the month of July. These were passed as free from pests after careful examination. Owing to the possibility of some infested shipments arriving at this season of the year your Superintendent called on the leading importers of rice and asked them to unite on a systematic inspection at the port of Kobe, preferably under government supervision, and I also urged them to do their utmost to prevent any rice which has not previously been fumigated from being shipped here as such rice, if at all infested and placed on board the steamer will soon infest all the rice which has been fumigated and with which it would come in contact. The Japanese Merchants' Association has taken the matter up in a very business-like way and through their request the Japanese Consul has cabled his government about the matter. The Merchants' Association has also forwarded letters explaining the situation. Owing to the settling of the Channel wharf, the large rooms in

which we have been able to fumigate all infested rice and other produce arriving here, are now in such a leaky and unsafe condition as to render them worthless for our work. We are at a loss to know just what to do in case any very large infested shipment of rice or other produce should arrive here and it might be necessary for the Board to provide some large tight room for our work in the near future.

Pests Intercepted.

18 packages of fruit and 42 packages of vegetables were confiscated from passengers and immigrants during the month. Several packages contained colonies of ants and had to be fumigated before delivery.

Queen Bees.

During the month 3 Queen bees arrived by mail with attached certificates of inspection required by law. The package and attendant bees were destroyed after the Queen was taken out.

Beneficial Insects.

Two lots of carabid beetles were sent to the Board of Agriculture and Forestry by Dr. Burgess of the Gypsy Moth Parasite Laboratory, Melrose Highlands, Mass. These arrived in fairly good condition and have been liberated.

Inter-Island Inspection.

During the month of July, 70 steamers were attended to and the following shipments were passed:

- 41 packages of plants (mostly forest trees),
- 475 bags taro,
- 1 bag taro tops,
- 4 bags cocoanuts,

521 packages inspected and passed.

The following packages were refused shipment:

- 322 packages of various fruits,
- 25 " of vegetables,
- 8 " of plants.

355 packages inspected and refused shipment; 2 packages of tomatoes were found infested with maggots.

The postoffice department has revised the regulations concerning the transmission of insects, plants, etc., requiring a certificate of inspection of all shipments before they are forwarded by the local postoffice. This is another burden which has been thrust upon the many duties of your Superintendent and will no doubt

cause some annoyance and inconvenience to the general public. I attach herewith a copy of the regulation.

New Postal Regulations.

The following statement of the revised regulations of the post-office department concerning the transmission of insects through the mails has been kindly supplied by Dr. L. O. Howard, Chief of the Bureau of Entomology:

"Queen bees and their attendant bees, when accompanied by a certificate from a State or Government inspector that they have been inspected and found free of disease; beneficial insects, when shipped by departments of entomology in agricultural colleges and persons holding official entomological positions; other live insects, when addressed to the Bureau of Entomology of the United States Department of Agriculture, to departments of entomology in State agricultural colleges and to persons holding official entomological positions, and dried insects and dried reptiles may be sent in the mails when so put up as to render it practically impossible that the package shall be broken in transit, or the persons handling the same be injured, or the mail bags or their contents soiled.

"Nursery stock, including field-grown florists' stock, trees, shrubs, plants, vines, cuttings, grafts, acions and buds (which may carry injurious insects) may be admitted to the mails only when accompanied by a certificate from a State or Government inspector to the effect that said nursery stock has been inspected and found free from injurious insects."

Hilo Report.

Brother M. Newell reports the arrival of 7 steamers carrying vegetable matter amounting to 109 lots and 1,642 parcels, all of which are found free from pests. He comments on the fine appearance and condition of the California fruit.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

THE SOIL AND THE PLANT.

Dr. E. J. Russell, of Rothamsted Experimental Station, has a paper in *Science Progress*, reviewing some recent American hypotheses which seem to upset several established points as to soil. Dr. Russell, after a careful examination, arrives at the following conclusion which indicates the differences as well:

The outstanding differences between Whitney's hypotheses and those more generally accepted may therefore be reduced to three:

(1) Whitney supposes all soils to be chemically alike in that all are made up of the same rock material; consequently the soil solution is the same in all cases. Other chemists, on the other hand, consider that the soil is more complex, containing colloidal decomposition products and a solution which not only differs in composition in different soils but also shows local variations in composition in different parts of the same soil.

(2) He further supposes that variations in concentration of the soil solution have no effect on the rate of growth of plants and that in consequence all soils are equally rich in plant food; added fertilizers owe their value to other than nutritive effects.

(3) He considers that infertility must therefore be due to other causes than lack of nutritive compounds; dismissing considerations of nutrition altogether, he supposes instead that infertility arises from the presence of toxic organic compounds, some of which at any rate may be plant excretions. We, on the other hand, attach great importance to the nutritive functions of soil constituents and of added fertilizers; while some of us agree that part of the infertility of "sour" soils may be due to toxic substances (and apparently the soils examined by Whitney and his colleagues were "sour" soils), we cannot accept the view that plants excrete toxic substances.

There is no doubt that the work of the Soil Bureau has suffered from leaving out of consideration all biological changes going on in the soil. The decomposition by micro-organisms of the residues of previous generations of plants gives rise beyond doubt to quantities of plant food, yet the function of this nutrient material is never considered; instead, attention is concentrated on possible toxic substances to the exclusion of useful substances. Thus the field of view is unduly restricted.

The investigations have, however, served a very useful purpose in stimulating inquiry and they have brought home the fact that the relationships between soils and plants are complex, it is no longer possible to take the old narrow view that the soil simply supplies food to the plant: the earlier papers compelled recognition of the fact that the size of the soil particles which regulate the water and air supply is more important than their chemical composition, and consequently that mechanical analysis is more useful than chemical analysis in characterizing soils; the later papers direct attention to possible toxins of which we may have some in our own "sour" soils. We can find much to criticise in the details of the experiments and still more in the conclusions drawn from them; not infrequently the facts themselves are in dispute. Above all we should like to see a re-examination of the fundamental positions based on definite crucial experiments and consideration of alternative hypotheses. But, whether further work support their hypotheses or not, Whitney, Cameron, Schreiner and their colleagues have made agricultural chemists re-examine their ideas on the soil, and such a reconsideration must in the end ad-

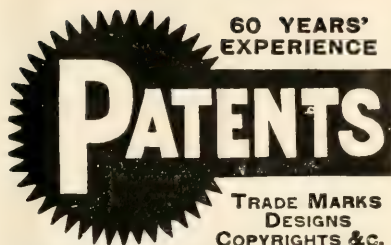
vance the subject, however troublesome or superfluous it may at the time appear.

FLOWERS OF THE PAPAYA.

It is well known in the West Indies that, although the male and female flowers of the papaya tree are usually produced on separate trees, flowers possessing both characteristics (hermaphrodite flowers) and arising in female inflorescences, are often found, and that it is also possible to cause a "male" tree to bear female flowers and ultimately fruits, by cutting it back.

L'Agriculture Pratique des Pays Chauds for October, 1911, gives attention to an exceptional case, where hermaphrodite flowers arose in a male inflorescence, in a note which describes a plant in the Jardin Colonial in Upper Guinea, near Kindia. This plant had already borne male flowers, without fruiting, when suddenly at its full flowering time, it produced long axillary inflorescences containing gamopetalous flowers with normally developed stamens and a rudimentary ovary. At the time of reporting, three fruits had appeared, each about 4 inches long, and soon after a young fruit about half as large. One of the fruits was plucked, and was found to contain numerous normal ovules. It was not expected, however, that these would attain a true maturity, as their stalks were exhibiting a yellowish tint which indicated premature ripening.

In presenting the note, mention is also made of the observation of a similar phenomenon, about 1887, by a French authority and by travelers in Central Africa.



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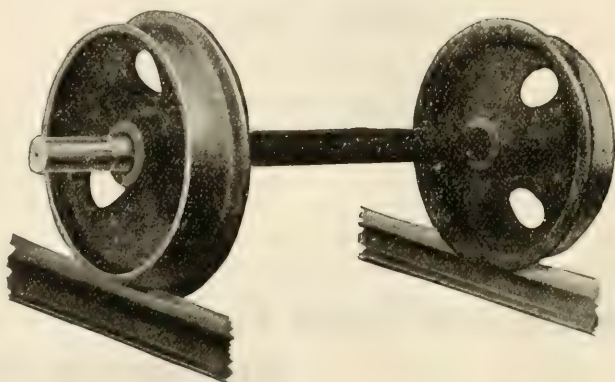
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Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

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- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
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- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
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- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
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- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 5; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws. 11 pp.; unnumbered pamphlet; Revised 1910.
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To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

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THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

SEPTEMBER, 1912.

No. 9.

EDITORIALS.

The Massachusetts Forestry Association issues the following boosting card:

Here is a little state which we think is mighty fair;
It has tried to save its forests as a man would save his hair;
But, alas, 'tis bald in places, nothing left but stumps or embers,
All because this 'socation doesn't have enough of members.
Are you one?

From the L. L. Poates Publishing Company, 22 North William street, New York, has been received an Atlas of the World, which is got up in very neat and clear style. It is represented to have "193 pages of maps, alphabetical index of states and countries, besides the states with their counties and important cities and towns with their populations, according to the 1910 United States census, and the principal cities of the world." As Honolulu is not found among the "important cities and towns," even, let alone "the principal cities," in this book, it is a fair presumption that the work is composed to some extent at least of stale material dug out of older publications. There can be no excuse for leaving Honolulu out. Hawaii as a whole, it may be added, is presented in this Atlas only by a contemptible little map.

Tropical Life (London) for August says: "One of our Hawaii friends writes us that experimental tappings of Ceara rubber trees out there under official supervision yielded 14 ounces per tree, five to six years old. This was obtained during the course of a year, each tree being tapped sixty times, or an average of once in five working days."

A circular of the Porto Rico Agricultural Station says that bees are very fond of working the blossoms of the cocoanut palm, and are ready to start work directly the blossom sheath begins to open. So many bees work on a blossom that their buzz resembles the noise made in swarming. Although the cocoanut does not furnish as much honey per tree as the royal palm, in the aggregate the amount obtainable must be much more, and

the bees seem very ready to work the coconuts. Coffee blossoms are said to yield food for the bees very freely.

Reviewing a handbook on education, by H. Osmond Newland, founder of the British West African Association and the Egyptian Association, *Tropical Life* bewails the kind of education the parents of Greater London are forced to accept under pains of fines and imprisonment if they do not make the children undergo it. For all but perhaps 50 per cent of the children, the magazine sets forth, the existing system tends to force them "to misery and want." What it says further in the following quotation is worthy of study in Hawaii, where, happily, some people and the legislature have already taken up the central idea presented: "Our present system encourages, if it does not actually force, countrymen and townsmen alike to flock into the cities, whereas what this empire is crying out and starving for is decentralization, is the need of not only driving our surplus population out of the cities, but also out of the country, to go elsewhere to earn their living and increase the trade of this country. The only compulsion we believe in is compulsion to work. It is the only thing the law does not insist upon. It compels you to be educated in a way that, with at least 50 per cent of very poor, leads to nowhere; it punishes you if you do not insure; if you do not call in the doctor when ill; if you prefer to starve than to live on charity; but to train you to be of a real help to your country and to yourself by teaching you agricultural industries, and forcing those who cannot earn the much discussed minimum wage in the large towns and cities, which many are not worthy of, to go back to the land and earn what they can, and all they are worthy of, has not entered into the minds of our educational experts, who teach you what they want you to learn, not what you, the student, require to know."

A report of the proceedings of the West Indian Agricultural Conference, 1912, continued in No. 3, Vol. XII, of the *West Indian Bulletin*, contains some papers on sugar which should be of much interest to Hawaiian planters.

"Insect Pests of the Lesser Antilles," by H. A. Ballou, M. Sc., an entomologist on the staff of the West Indies department of Agriculture, has been received. It is a pamphlet of 210 pages, and is copiously illustrated. "The Mediterranean fruit fly," the work says, "is perhaps the most widely distributed of the fruit flies."

FOREST RESERVES.

REPORTS OF THE SUPERINTENDENT OF FORESTRY MAKING RECOMMENDATIONS WITH REGARD TO THREE FOREST RESERVES.

On Island of Molokai.

Honolulu, July 25, 1912.

Board of Commissioners of Agriculture and Forestry,
Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a report recommending that a forest reserve be created on the Island of Molokai, County of Maui:

OBJECT.

The object of this proposed forest reserve is to protect and permanently to maintain the forest cover on the upper mountainous parts of the island, so that the sources of water—the springs and streams thereon—may be safeguarded, and as far as possible the regularity of their flow assured.

All along the lee shore of Molokai at the lower elevations, but especially near Kaunakakai, is much land that is potentially of high value for intensive agriculture, could it be brought under irrigation. Attempts to secure water on a large scale from wells have proved unsuccessful. Various plans for the development of the mountain water have been proposed,* but up to the present time only comparatively small quantities of water, sufficient only for watering live stock, have actually been brought out of the hills.

Sooner or later it is almost certain that some practicable plan will be evolved whereby the mountain water can be collected and led out to where it is needed. Looking forward to that time, it is expedient that provision be made now for keeping the watershed in the best possible condition.

This is a matter which interests all the owners of the uplands, private parties as well as the government, for any comprehensive program for the systematic development of the mountain water on Molokai would doubtless cover the entire island. The chief value of these upper lands is as producers of water. The owners should see to it that when the proper time comes to dispose of it, the largest possible quantities of water are ready to be sold. Because it will help to accomplish just this end is the main purpose in setting this section apart as a forest reserve.

* Especially in a report by Waldemar Lindgren, "The Water Resources of Molokai"; U. S. Geological Survey, Water Supply Paper No. 77; Washington, 1903.

LOCATION AND AREA.

The area proposed to be set apart lies mauka of a line varying in elevation from 1500 to 2000 feet that circles the eastern half of the island. The total area included is 44,674 acres, of which 13,268 acres, 30 per cent., is land belonging to the Territorial government. Of the remainder, that in private ownership, a large share is held by a few individuals or corporations. So far as it has been possible to ascertain, almost all of the owners of forest land on Molokai are in sympathy with the objects for which the reserve is created. Most of them have expressed their intention of coöperating more or less actively in making the reserve effective on the ground.

The various lands contained in the proposed Molokai Forest Reserve, with their area and ownership, are shown in the following table. The areas were compiled by the Government Survey Office, as a part of the official description:

| Name. | Area acres | Owner. | Lessee. | Lease No. |
|-------------------------------|---------------|------------------------|------------------------|--------------|
| Iholi | 156.0 | Meyer Bros. | | |
| Naiwa | 70.0 | Meyer Bros. | | |
| Kahanui (L. C. A. 7755) | 317.0 | Meyer Bros. | | |
| Kalanaula | 1621.0 | Government | American Sugar Company | 117 |
| Kahanui (Grant 3437) | 1048.0 | Meyer Bros. | | |
| Kaunakakai | 965.0 | American Sugar Company | | |
| Kupaakea | 220.0 | Government | American Sugar Company | 117 |
| Kamiloa 1 | 490.0 | { Government | | |
| Kamiloa 2 | 550.0 | | | |
| Makakupaia mauka | 490.0 | | | |
| Makakupaia makai | 654.0 | American Sugar Company | | |
| Kawela | 3850.0 | American Sugar Company | | |
| Makolelau | 253.0 | Mrs. F. Foster | L. H. Dee | |
| Kamalo | 1600.0 | Bishop Estate | Meyer Bros. | |
| Kapualai } | 923.0 | Austin Estate | | |
| Kameli } | | | | |
| Wawaia } | | | | |
| Puaahala | 163.0 | Government | (Unleased) | |
| Maumola | 33.0 | Bishop Estate | | |
| Keawanui | 182.0 | Bishop Estate | | |
| West Ohiia | 172.0 | Kunuu (?) | | |
| East Ohiia | 220.0 | Government | | |
| Manawai | 416.0 | Th. Meyers (?) | | |
| Kahananui | 182.0 | { Government | A. Rodrigues | 655 |
| Ualapue | 194.0 | | | |
| Kaluaaba | 694.0 | H. R. Hitchcock | | |
| Mapulehu | 1007.0 | C. C. Conradt | | |
| Ili o Punaula | 152.0 | Mrs. E. M. Nakuina | | |
| Pukoo | 124.0 | Government | | |
| Kupehe | 63.0 | Mrs. C. B. Buchanan | | |
| Alaiho 1 | 96.0 | | | |
| Alaiho 2 | 100.0 | L. Weinzheimer | | |
| Hononuni | 415.0 | Mrs. E. M. Nakuina | | |

702
701

C. Kaanoi

(Unleased)

| Name. | Area acres | Owner. | Lessee. | Lease No. |
|---|---------------|---------------------------------|---------------------------------|--------------|
| Kawaikapu (Grant 3108)..... | 67.0 | Mrs. E. M. Nakuina | | |
| Kanalu (Grants 3730:2 and 1140:1)..... | 572.0 | Vincent, Bowen & Co. | | |
| Pulele..... | 14.0 | Liliuokalani Trust | | |
| Puniohua 1..... | 1.5 | { Vincent, Bowen & Co. | | |
| Puniohua 2..... | 2.5 | | | |
| Waialua..... | 627.0 | Hui | | |
| Manui..... | 282.0 | Tollefsen & Christensen | | |
| Honouliwai..... | 378.0 | Government | | |
| Honoulimao..... | 175.0 | Kapiolani Estate | (Unleased) | |
| Lupehu (Grant 1836)..... | 83.0 | J. F. Brown half; J. Jones half | (in dispute) | |
| Pohakupili..... | 9.0 | Mrs. Pata Naki | | |
| Mokea..... | 218.0 | Estate of Mana King | Mr. J. F. Brown | |
| Keopukaiku..... | 16.0 | Hui (J. F. Brown in part) | | |
| Keopukaboa..... | 810.0 | Hui | | |
| Halawa..... | 7190.0 | Bishop Estate | | |
| Wailau..... | 8540.0 | Government | | |
| Polekunu (including grants and kuleanas)..... | 4512.0 | J. B. Castle | A. C. Dowsett | 540 |
| Waikolu..... | 3400.0 | Board of Health. | Valley belongs Leper Settlement | |
| Makanalua..... | 142.0 | Board of Health. | Valley belongs Leper Settlement | |
| Kahanni (Grant 3539 to Meyer)..... | 215.0 | Meyer Bros. | | |
| <hr/> | | | | |
| 44674.0 | | | | |

The data in regard to ownership were compiled after consultation with various persons familiar with Molokai.

The Boundary.

In common with the usage in other Hawaiian Forest Reserve projects, the boundary of the proposed Forest Reserve has been drawn across both government and privately owned lands so as to include all the area which in the judgment of the Superintendent of Forestry should be permanently maintained as forest. Starting on the Molokai Ranch boundary, at a point near the pali overlooking the Leper Settlement and following the forest fences across the Molokai Ranch, the line runs along the southeastern slope of the Molokai mountain as far as Halawa gulch, from one to another of the triangulation stations erected at the time the island was surveyed by the government. These points are located on the ridges, practically at the edge of the existing forest. The line runs mauka of the heads of the greater part of the many small lands along the southeast coast.

Beyond Halawa the line is one of natural boundaries. It follows the sea coast but excludes, by description, "all the cultivated or agricultural land in the valleys of Halawa, Wailau, Pelekunu and Waikolu, all land in Waikolu, and Waihanau that may be used or required for public purposes and all flat land along the shore at the foot of the bluffs."

At the Settlement the line runs up the pali, skirts the top of the bluff for a way, and connects with the Molokai Ranch fence by crossing the fee simple lands of the Meyer Brothers.

The Meyers' Lands.

With the exception of the Meyers' lands, practically all the areas included within the reserve is now under forest or in process of being reforested. Most of the forest at the east end of the island is now, of course, subject to cattle grazing, but almost all the larger owners have expressed their intention sooner or later of fencing off the forest. The Meyers' lands, on the contrary, are now used regularly for grazing, and it is the intention of the owners to continue so to use them. The larger part of the Meyers' lands within the forest reserve limits are now open.

In my judgment it would be for the best interests of the island as a whole were these particular lands again got under forest, more especially the portion of Kahanui bordering the great Waikolu Gulch, through which land run the small gulches that unite to form the Waihanau Gulch that comes out above the Leper Settlement on the land of Makanalua.

From a water supply standpoint this is a highly important portion of Molokai, because while the area is small, only about one square mile, it is subject to heavy rainfall, while from its location the Waihanau is a stream that could readily be diverted and put to use. Speaking of this stream, the Waihanau, Lindgren says (l. c. p. 31): "Swamps line the borders and much water comes in

from springs on the sides of the abrupt canyon in which it flows. . . . I conclude that the stream can be relied on for 3,250,000 gallons per 24 hours from November 1 to June 1, for 1,000,000 gallons during June and July and for at least 100,000 gallons from August 1 to November 1." When water is as badly needed and as valuable as it is on Molokai, it is not good policy to use such an important catchment area as this for grazing. On a good portion of upper Kahanui the native forest would probably come back naturally if cattle were excluded. Lower down artificial planting would be necessary. On the lower portion of Kahanui mauka, but still within the line of the proposed reserve, are "Meyer's Lake" and one or two other possible reservoir sites.

Theoretically, the proper thing would be for the Territorial Government to take over this land, at a fair valuation, but practically there is no fund available for making such purchases. Owing to complications resulting from the fact that the Meyers' lands are parts of the undivided estate of the late R. W. Meyer, under the terms of a will which provides that the estate cannot be finally settled during a term that has yet many years to run, it would not be easy to effect a transfer of title. But, possibly, in time, were a Molokai water company formed, it might be possible through a long lease to control the lands for a sufficient time to make it pay to get a new forest started. In the meantime the fact that a forest reserve line has been drawn across it on the map as a guide for future action, does not affect the Meyer Brothers in practice if they see fit to continue to use their lands for grazing.

At present Kahanui is separated from the Molokai Ranch Company's lands by well kept fences. Should some plan of full reservation not previously have been effected, provision for the maintenance of this fence should be made when the present lease of the adjoining Government land of Kalamaula expires, in 1918. Similar provisions of fence up-keep should be included in the leases of all the other Government lands that run into the Molokai Forest Reserve.

Protection of the Forest.

In the matter of protecting and extending the forest on the Molokai mountain considerable interest has already been shown. Chief among those who are alive to the advantages of such action is the American Sugar Company, locally known at the present time as the Molokai Ranch, which for a dozen years now has maintained a forest fence across the upper lands, including both those held in fee simple and those held under lease from the Government. This fence, which is approximately 8 miles in length, was built in 1898 and 1899, voluntarily by the ranch company. Since that time cattle have been kept off the mountain, except for one paddock. And within the last two years that, too, has been given up.

That the lands at the east end of the island may get the full

benefit from the forest reserve requires that the forest line be fenced, except where there are natural barriers all along its course. On the few lands that belong to the Government, provision for fencing can be made when the lower end of the land comes again to be leased. This has already been done in the case of a couple of Government leases. Similar action will probably be taken by the Bishop Estate. Some of the other private owners would be willing to fence off their upper lands, but are unable to do so because of the expense. Under the circumstances about all that can be done just now is to point out where the line ought to be and lend what encouragement is possible to the construction of various stretches of the fence from time to time.

Owing to the configuration of the slope the line to be fenced consists for the most part of comparatively short stretches of fence, across ridges, between the impassable sides of gulches.

It is proper here to recall that at the time of the building of the Molokai Ranch forest fence, from 1898 to 1900, considerable money was spent by the Molokai Ranch Company in killing off the deer* and in getting out wild cattle that were then at large in the woods. In recent years enough deer hunting has been done practically to keep pace with the yearly increase. Deer are also found, and hunted, on the forest lands at the east end of the island.

In this connection, in view of the damage liable to result to the native forest from deer, the Territorial Government is on record as holding that in Hawaii deer are to be considered as being in the same class with goats, animals to be regarded as pests to be got rid of.

There are several large bands of goats on Molokai. The Molokai Ranch Company has lately had several systematic goat drives and is using other means to clear their mountain lands of this enemy of the forest. By these efforts the bands are gradually being reduced in number, but it is work that ought steadily to be continued until the goats are exterminated.

It should also be noted here that for the purpose of bettering the water holding condition of the catchment basin, forest planting is now being done by the Molokai Ranch Company on the mountain, at Maunahu'i, near Kahanui, on the land of Kaunakakai. In many places above the forest fence the native vegetation is coming back naturally. There it was felt to be desirable to expedite matters by artificial planting.

RECOMMENDATIONS.

For the reasons set forth in the foregoing pages I do now recommend that the Board of Agriculture and Forestry request the Governor of the Territory, in accordance with the usual procedure, to create a forest reserve on the Island of Molokai, to be

* Introduced from the Orient and turned loose on Molokai during the reign of King Kamehameha V, in the late sixties.

known as the Molokai Forest Reserve, and to set apart all government lands that lie within its boundaries.

Accompanying this report is the official description of the boundary of the proposed Molokai Forest Reserve, prepared by the Government Survey Office, together with a blue print of the eastern half of the island showing the location of the Reserve.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MOLOKAI FOREST RESERVE.

Island of Molokai.

Beginning at a point in the land of Ilioli on the top of the pali, said point being due north of Government Survey Trig. Station "Puu Olelo";

1. Thence 3300 feet, more or less, due south across the lands of Ilioli and Kahanui (Grant 2709, L. C. A. 7755) to Government Survey Trig. Station "Puu Olelo" in the land of Naiwa;
2. Thence 2000 feet, more or less, in a southwesterly direction across the lands of Naiwa and Kahanui (L. C. A. 7755) to a point on the boundary of Kahanui (L. C. A. 7755) and Kalamaula;
3. Thence 60 feet, more or less, in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula;
4. Thence 2440 feet, more or less in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula;
5. Thence 3400 feet, more or less, in a southwesterly direction along the boundary between Kahanui (L. C. A. 7755) and Kalamaula to where the forest fence begins;
6. Thence 1000 feet, more or less, in an easterly direction along forest fence across the land of Kalamaula;
7. Thence 2000 feet, more or less, in an easterly direction along forest fence across the land of Kalamaula;
8. Thence 3000 feet, more or less, in a southeasterly direction along forest fence across the land of Kalamaula;
9. Thence 2250 feet, more or less, in a southeasterly direction across the land of Kalamaula along the forest fence;
10. Thence 3300 feet, more or less, in a southeasterly direction across the land of Kalamaula along the forest fence to a point on the boundary of Kalamaula and Kaunakakai;
11. Thence 16300 feet, more or less, in a general southeasterly direction across the lands of Kaunakakai Kapaakea, Kamiloa 1 and 2, Makakupaia mauka and Makakupaia makai and along the forest fence to a point which is 2800 feet directly south of Government Survey Trig. Station "Makakupaia" in the land of Makakupaia makai;
12. Thence 10600 feet, more or less, in a southeasterly direction across the lands of Makakupaia and Kawela along the forest fence;
13. Thence 4000 feet, more or less, across the land of Kawela along the forest fence to a point on the boundary of Kawela and Mokelelan, said point being 4400 feet, more or less, southwest of Government Trig. Station "Puu Kolekole";

14. Thence 2800 feet, more or less, in a southeasterly direction across the land of Makolelau to the head of the land of Kapuaokoolau;
15. Thence 8500 feet, more or less, in an easterly direction across the land of Kamalo to a point on the ridge on the eastern boundary of Kamalo, said point being 2000 feet south of Government Survey Trig. Station "Kaapahu";
16. Thence 9100 feet, more or less, in a general southeasterly direction across the lands of Kapualei, Kumueli, Wawaia, Puaahala, Kaamola and Keawanui to a point 1000 feet south of Government Survey Trig. Station "Ohianui" on the last-named land;
17. Thence 9300 feet, more or less, in a general northeasterly direction across the lands of Keawanui, West Ohia, East Ohia, Manawai, Kahananui, Ualapue and Kaluaaha to a point 500 feet, more or less, south of Government Survey Trig. Station "Kaluaaha" on the last-named land;
18. Thence 5600 feet, more or less, in a general northeasterly direction across the lands of Kaluaaha, Mapulehu and the Ili of Punaula to Government Survey Trig. Station "Pukoo" on the west boundary of Pukoo;
19. Thence 3000 feet, more or less, in a general northeasterly direction across the lands of Pukoo, Grant 1135, Apana 3, Kupeke and Ahaino 1 to Government Survey Trig. Station "Ahaino" on the boundary between Ahaino 1 and 2;
20. Thence 8250 feet, more or less, in a general northeasterly direction across the lands of Ahaino 2, and Honomuni to the head of the land of Kamanoni, thence continuing in the same direction across the lands of Kawai-kapu, Kainalu, Puelelu, Puniuohua 2 and Puniuohua 1 to Government Survey Trig. Station "Wai-alua" on the west boundary of Wai-alua;
21. Thence 8100 feet, more or less, in a northeasterly direction across the lands of Wai-alua, Moanui and Honouliwai to Government Survey Trig. Station "Moanui";
22. Thence 5200 feet, more or less, in a northeasterly direction across the lands of Honouliwai, Honoulimaloo, Lupehu, Pohakupili and Moakea to a point on a small peak a short distance south by east of Government Survey Trig. Station "Halawa";
23. Thence 4050 feet, more or less, continuing on the same northeasterly line across the lands of Moakea, Keopukauku and Keopukaloa to a point on the edge of the pali of Halawa called Koholua;
24. Thence 5400 feet, more or less, in a northwesterly direction across Halawa Valley to the Government Survey Trig. Station "Kawaikapu";
25. Thence 3450 feet, more or less, in a northerly direction to the Government Survey Trig Station "Apuu";
26. Thence 650 feet, more or less, in the same direction to the sea coast;
27. Thence along the sea coast to the boundary between Halawa and Wailau;
28. Thence along the sea coast to the boundary between Wailau and Pelekunu;
29. Thence along the sea coast to the boundary between Pelekunu and Waikolu;
30. Thence along the seacoast to the boundary between Waikolu and Kalawao;

31. Thence along the boundary between Waikolu and Kalawao to top of pali being the intersection of the boundaries of Waikolu, Kahanui (Grant 3437) and Kalawao;
32. Thence along the top of pali between the boundaries of Kahanui (Grant 3437) and Kalawao to the southwest corner of Kalawao;
33. Thence along the top of the pali between the boundaries of Kalawao and Kahanui (Grant 3539 to Meyer) to a point between the boundaries of Kalawao and Makanalua called Alae;
34. Thence along the top of the pali between the boundaries of Kahanui (Grant 3539 to Meyer) and Makanalua to a point due east from the boundaries of Kalamaula and Kahanui on the westerly boundary of Makanalua;
35. Thence due west across the Waihanau Valley to the westerly boundary of Makanalua and the boundary point between Kalamaula and Kahanui;
36. Thence along the top of the pali between the boundaries of Makanalua and Kahanui to a point between the boundary of Makanalua and Kalaupapa called Iliilika;
37. Thence along the top of the pali along Kalaupapa to the point of beginning.

Containing an area of 44,674 acres.

Excepting and reserving therefrom all the cultivated or agricultural land in the valleys of Halaawa, Wailau, Pelekunu and Waikolu, and all land in Waikolu and Makanalua that may be used or required for public purposes, and all flat land along the shore at the foot of the bluff.

Addition to Waianae-kai Reserve.

Honolulu, July 26, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I have the honor to submit as follows a report recommending that the Waianae-kai Forest Reserve, District of Waianae, Island of Oahu, be increased by the addition of an area of 396 acres, lying in the upper middle part of Waianae Valley.

The Waianae-kai Forest Reserve was created by proclamation of Gov. G. R. Carter on September 7, 1906. It now embraces a total area of 3257 acres, of which 3150 acres, 97 per cent., is Government land. The Reserve is made up of two classes of land, the forested slopes of the main ridge of the Waianae Mountain and the more or less arid section in the upper part of the Waianae Valley and on the sides of the lateral ridges running down toward the sea.

The object of the reserve, as stated in my report on the matter in 1906, is:

“by the re-establishment and maintenance of a forest cover, to assist in securing a more regular flow in the springs and brooks on the land, and to put to economic use areas which from their topography and situation are incapable of being profitably used for any other purpose than producing trees.”

The proposal now is to include in the forest reserve an additional area of land of the semi-arid type (outlined on the accompanying blue print in colored pencil) for the reason that it will serve the Territory better if made a part of this forest reserve than if it is used in any other way.

The solution of the question of the right use of the Government land in Waianae Valley turns essentially on the supply of water. Were a greater quantity available much more of the valley might be devoted to intensive agriculture than is now possible. As it is the lower lands, now mainly cultivated in sugar cane, carry the prescriptive right from ancient times to practically all the water in the regular flow of the stream. From the configuration of the valley it does not appear feasible to construct storm-water reservoirs except at prohibitive expense.

This portion of Waianae is too dry to permit the growing of agricultural crops without at least some irrigation. About the only other use is grazing and to such use of this particular area there are several objections. First, because being somewhat isolated, it is too small to be of much value as an independent paddock. Second, because its use for grazing would render liable the continuation of trespass by cattle on the forest reserve, which in the recent past it has been found difficult to control, and third, because with the outlook that exists at Waianae for getting forest planting started, it appears that in any event on this particular tract a better showing of returns to the Government could be made from trees than from cattle.

As has been said by me in earlier reports on this valley, the Waianae Plantation Company has for some years been carrying on, at its own expense, forest planting on the Waianae-kai Forest Reserve. As a part of an agreement regarding the use of certain waters rising in the forest reserve, the settlement of which is now pending in the Land Office, the Waianae Company is ready to undertake the planting of additional areas and, moreover, to build and maintain a fence on the lower boundary of the proposed addition and in such other places along the borders of included kuleanas as may be necessary efficiently to protect the forest reserve.

The area now proposed to be set apart was cut up into lots when the Waianae Valley was surveyed a few months ago for the so-called Pahoia Homestead subdivision. It was, however, never offered to the public, being withdrawn on the grounds, as above set forth, that it would be of greater advantage to the Valley as a whole if added to the Forest Reserve. The land is now under lease (No. 602, expiring July 1, 1913) to the Waianae Company. This whole question has received the personal attention both of the present and of the last Commissioner of Public Lands. Both favor the project here proposed.

For all these reasons I therefore do now recommend that the Board of Commissioners of Agriculture and Forestry approve this project and request the Governor of the Territory to set

apart, in accordance with the regular usage, the portion of the Government land of Waianae-kai described below, as an addition to the Waianae-kai Forest Reserve. Following is the technical description of boundary prepared by the Government Survey Office:

ADDITION TO WAIANAE-KAI FOREST RESERVE, WAIANAE,
OAHU.

Beginning at Government Survey Trig. Station "Kauaopuu" as shown on Government Survey Registered Map No. 2501 and running by true azimuths:—

1. 92° 37' 2034.0 feet along ridge to a stake;
2. 95° 06' 626.6 feet to a + on rock at spur;
3. 64° 40' 1057.5 feet to a + on rock at the East corner of Pahoia L. C. A. 7713 apana 1 to V. Kamamalu;
4. 124° 08' 688.5 feet along Pahoia L. C. A. 7713 apana 1 to V. Kamamalu to a stake;
5. 116° 26' 733.4 feet along Pahoia L. C. A. 7713 apana 1 to V. Kamamalu and along Lot 49 to a + on rock at the North corner of Lot 49;
6. 60° 00' 244.1 feet along Lot 49 to an iron pin;
7. 123° 45' 868.4 feet across road and along Lot 15 to an arrow on rock on east line of Forest Reserve;
8. 213° 33' 4445.3 feet along Forest Reserve to a + on rock at corner of stonewall;
9. 249° 51' 825.0 feet along stonewall along Forest Reserve to an iron pipe;
10. 245° 14' 955.0 feet along stonewall along Forest Reserve to + on rock known as Trig. Station "Kolealilii."
11. 342° 01' 5425.0 feet along Forest Reserve to the point of beginning.
Area 396 Acres.

Excepting and reserving therefrom all grants and L. C. Awards and rights-of-way 8 feet wide for the 4-inch water supply pipe and for a 12-inch electric water power pipe within this lot.

Very respectfully,

RALPH S. HOSMER.
Superintendent of Forestry.

Creation of Kula Reserve.

Honolulu, August 1, 1912.

Committee on Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

Gentlemen:—I have the honor to submit as follows a report recommending the creation of a forest reserve in the District of Kula, Island and County of Maui, which I propose be called the Kula Forest Reserve.

The area in question is a tract of 6075 acres lying on the western slope of Mt. Haleakala, between a line drawn along the slope at

an elevation of approximately 5000 feet and the crest of the mountain extending from, and including the land of Waiakoa to the southern extension of the main ridge.

The proposed reserve is made up of both government and privately owned lands. The former, 5069 acres, constitutes 83% of the total area. None of the government land is now under lease.

Included in the proposed reserve is the Polipoli Spring, the only permanent source of water on the southern end of Mt. Haleakala. One of the objects underlying the creation of the reserve is to establish a forest cover on the area adjacent to this spring, for notwithstanding the fact that water is now brought to the district by the Kula Pipe Line, Polipoli must always remain a locally important source of supply. Along with getting trees to grow on land that can better be used for forest than for any other purpose, it is obvious that any measures that will tend to increase the flow of such a spring as Polipoli are seriously to be considered.

History.

Prior to about 25 years ago there was a belt of heavy forest with dense undergrowth in the Kula District between the elevations of 3500 and 5000 feet, that is throughout the section immediately above the corn belt. Gradually this forest was opened up by grazing until now it has practically disappeared save as its former extent can still be traced by dead stubs, small groups of trees in certain steep-sided gulches where they are protected from cattle, and scattered groves of Mamane.

Looking up from below, from the Government road, the remaining dead trees make it appear that there is still a considerable stand. But when one gets into it he finds that the former forest belt is now open country with a heavy ground-cover of grass.

The area formerly covered by the Kula forest is now considered the best grazing land in the district. It has so been used for the past twenty years or more. Up to November 1, 1911, the upper lands of Waiohuli and Keokea, up to the crest of the mountain were under lease to the Cornwell Ranch for grazing. Waiakoa and Alae 3-4, for a time unleased, along with the fee simple lands of Kaonoulu and portions of Alae 1-2 were also so used.

When the time came for re-leasing the Government lands, the administration decided, after careful consideration of the whole matter, that it was best again to lease the strip of grazing land above the corn belt, but that the higher slopes should be reserved. This action was largely based on the facts that the old native forest was so far gone that its replacement through natural reproduction was practically out of the question and that, because of its value as grazing land, this section materially increased the usefulness of the lower portions of the lands.

The proposed Kula Forest Reserve, therefore, consists of the

slopes of the mountain above an elevation of approximately 5000 feet.

The location of the forest reserve boundary was fixed after a full discussion of the relative value of this area for grazing or for forest had been had on the ground with a number of Kula ranch men. The line adopted by the Government as the forest line and mauka boundary of the grazing land was selected as the result of this conference, backed by other information acquired by me from time to time during that and other visits to Kula. The line was run out on the ground by Mr. S. M. Kanakanui of the Government Survey Office, the important points being marked by forest reserve monuments.

The new leases of Waiohuli-Keokea (No. 742) and Waiakoalae 3-4 (No. 743) contain, along with tree planting requirements for the lower, grazing lands, a provision that a fence shall be built and maintained on this forest line. Under the terms of the leases this fence must be built "within one year from November 1, 1911."

Reasons for the Kula Reserve.

The proposed Kula Forest Reserve differs from most of the forest reserves so far created in this Territory, in that it is essentially an area where a forest cover must be established. This naturally must be a matter of time, but if gone about right I am confident that eventually forest can be made to cover a considerable part of this slope of Mt. Haleakala.

Above an elevation of approximately 6000 feet the old native lower-zone forest never did extend, giving place at that level, except for Mamane, to the scrub growth characteristic of the higher elevations of our mountains. Along the lower boundary of the forest reserve some of the trees of the lower forest zone may perhaps in spots be induced to come back—and every reasonable assistance should of course be given them to do so—but for the most part it is now too late.

Higher up, Mamane can be depended on. Indeed, during the past decade there has been a marked increase in Mamane on this slope of Haleakala, all the way from the crest of the mountain down to the proposed forest line, but particularly high up on the slope. Within a short time now the small trees will be large enough so that the groves in which they occur can be seen from a distance. Mamane is a valuable tree. Its spread should be fostered wherever practicable.

Over a considerable part of the proposed Kula Forest Reserve I believe that dependence in afforestation must and should be placed on introduced trees. Experience on Maui, both in Kula and above Makawao, has shown that certain of the Eucalypts are admirably adapted for use up to about 7000 feet, while planting experiments are now in progress which I am sanguine will in the end point the way to other exotic trees of economic value that can be got to grow and in time spread naturally over the mountain.

The establishment of a forest on the upper slopes in Kula must necessarily be a slow matter, but with the land set apart and devoted to this purpose steady gains can be made.

There are two reasons why this slope of Haleakala should be devoted to forestry. First, because although most of this area cannot profitably be used for agriculture, a large part of it can be made to grow economically valuable trees. This in itself is sufficient justification of its reservation, but to it may be added the second reason, the possible influence which a forest cover might exert on the local climate.

At present we have so little exact knowledge about this latter subject that generalizations are most unsafe, but it does appear that if an appreciable influence on precipitation can be effected anywhere by a body of forest, Kula is one of the likely places. If then, incidental to tangible and direct benefits through wood production, this influence can also be brought to bear, it is worth considering. Briefly the facts are as follows:

Kula is unfortunate in the scarcity of its natural supplies of water. Between the battery of small springs at Polipoli and the Waihou Spring on the boundary of the government land of Makawao, on the Haleakala Ranch, 10 miles or more distant, there is, save for the intermittent flow from a tunnel constructed by Mrs. Dora von Tempsky above Erehwon, no living water anywhere in the District. The local water situation as regards domestic supply has, of course, been relieved in the last two years by the construction of the Kula pipe line, but that does not change the lack of local sources of supply. Moreover, from the steepness of the slope it is difficult if not prohibitively expensive to store the storm waters that now run to waste down the larger gulches, not infrequently doing damage along their course. Incidentally, another advantage to be gained by a forest cover on the upper slopes is that thereby the run off after storms would be somewhat held back and the danger of erosion lessened.

As to possible influence of a forest on precipitation, the moisture bearing clouds that bring rain to the Kula District are of two kinds: (1) the trade wind clouds that pour over the Kahikinui Ridge, and (2) and probably more important, the Naulu clouds that, forming out of a clear sky over the island and channel of Kahoolawe, drift in and collect on the Kula side of the Haleakala Ridge from above Ulupalakua over to and beyond a point above Erehwon. Just how heavily laden with moisture these Naulu clouds are is a point on which opinions differ but in general I understand that there is frequently, if not usually, sufficient moisture so that water will condense on a rough woolen coat or on a man's beard. During seasons of continuous drought, however, like 1908 or the present year, the Naulu clouds seem to afford no relief to the lower lands.

The argument put forth in favor of a forest cover in this connection is that were a large enough stand of forest present the

slightly cooler surface thus presented would be sufficient to tip the delicate balance of other natural factors and cause some of the moisture to be precipitated.

Whether or not this would actually happen, experience in Upper Hamakua, Hawaii, has shown that through the drip from condensation on the leaves of trees standing exposed to moisture-bearing fogs very considerable quantities of water can be and in fact are collected in tanks and cisterns. I see no reason why a similar state of things should not obtain in upper Kula. And in view of the need of water I believe this is a phase of the subject that should at least be carefully investigated.

Sufficient returns to justify the initial outlay would in my judgment be got from the wood and timber produced from blocks of forest established in the reserve. Any beneficial influence that the forest might otherwise exert would be an advantage thrown in.

In any planting undertaken in the Kula Forest Reserve, the idea should be kept constantly in mind that in the end natural reproduction is to be depended on for the spread of the trees. The initial planting should be made so that the trees set out would act in the most efficient way as producers and distributors of seed. This, of course, applies to whatever species are used, Eucalypts or trees from the north temperate zone.

The questions of how the initial planting is to be paid for and of just what trees should be used do not need to be considered here. It is enough now if this area is set apart as a forest reserve.

The Polipoli Section.

Any tree planting undertaken on the Kula Forest Reserve should begin at the south end in the section that has for some years been held by the Land Office under the terms of Government Lease No. 542, as the Polipoli Spring Reserve. This area, a portion of the government land of Kamaole, is about a mile square. For the most part it is open land, covered by a heavy growth of grass. There are a few groups of Mamane and some scattering trees of other species.

The Polipoli water sources consist of a battery of six springs, two of which, Polipoli and Wai Kawekane, are within the fenced Polipoli reserve. Under Lease No. 542, the Henry Waterhouse Trust Co., Ltd., as trustees for the Ulupalakua Ranch, hold, rent free, for a term of 20 years, expiring in 1922, five-eighths of the flow from Polipoli Spring. Prior to the construction of the Kula Pipe Line the other three-eighths was conveyed by pipe down the slope to a tank on the government road as a public supply for the people of that locality. Of late this pipe has at times been out of repair. The rest of the water from Polipoli proper, with that from the other springs, goes by pipe to various parts of the Ulupalakua Ranch.

Under the terms of Lease No. 542 the Polipoli Reserve has been

fenced off and more or less efficiently kept free from cattle. Partly as the result of disputes between owners of the neighboring lands there has been a good deal of trespass at Polipoli, which is still going on intermittently. But realizing the value of the water, pretty nearly everybody agrees that the area ought to be reserved and efficiently protected. In this connection it may be said that from now on the fence maintenance clauses in all the leases that have to do with the Kula Forest Reserve boundary ought to be strictly enforced. Provision should be made also for policing the reserve as a whole against trespass.

It goes almost without saying that every effort should be made to safeguard the source and increase the flow of the Polipoli Spring. Getting a forest cover on the slope above the spring will, I believe, help somewhat in this regard.

Fencing the Boundary.

As previously stated the fencing of the makai boundary of the reserve where it adjoins government lands is already provided for. Across the fee simple lands of Kaonoulu and Alae 1-2 the owners of the Cornwell Ranch have agreed to continue the fence on the forest line.

At the north end, the boundary between Waiakoa and Kealahou is for some distance a gulch, impassable except at a few crossings, which runs well up toward the steep rocky upper slopes below the crest of the mountain.

Along the crest there is no fence, so that cattle from the Kahikinui side can and at times do come over, though not as much now as formerly because of paddock fences that have been built on that side of the mountain. The Kahikinui lease has eleven years yet to run. When it expires, if the matter cannot be arranged previously, provision should be made for fencing that will protect all the upper slopes of the mountain.

Around the south end of the ridge fences of the Ulupalakua Ranch connect with the fence about the Polipoli Reserve and keep cattle from drifting along the slope.

Recommendation.

For the reasons above set forth, which may be summarized by saying that the upper slopes of Mt. Haleakala can be made of most benefit to the Territory if gradually got under a forest cover, I do now recommend that the Board of Commissioners of Agriculture and Forestry approve the creation as the Kula Forest Reserve of the area covered by the following technical description of boundary prepared by the Government Survey Office, and that the Governor of the Territory be requested to take the usual steps officially to set apart the tract as a forest reserve in accordance with law.

Following is the description:

KULA FOREST RESERVE.

Including portions of the lands of Kamaole (Polipoli Spring), Keokea, Waiohuli, Alae 1 & 2, Alae 3 & 4, and Waiakoa, in the District of Kula, and portion of Papaanui, in the District of Kula, and portion of Papaanui, in the District of Honouliuli.

ISLAND OF MAUI.

(C. S. F. 2300)

Beginning at the forest reserve monument at the Northeast corner of Grant 517 to J. Sniffen and on the boundary of Keokea and Kamaole, the coördinates of said monument referred to Government Survey Trig. Station "Puu-o-Kali" being 15,027.5 feet South and 16,947.6 feet East, as shown on Government Survey Registered Map No. 2519, and running by true azimuths:—

1. 228° 58' 35" 13414.0 feet along the Waiohuli-Keokea Grazing land to a forest reserve monument at the head of the land of Koheo and on the boundary of Waiohuli and Kaonoulu;
2. 208° 02' 9948.7 feet across the lands of Kaonoulu, Alae 1 & 2, Alae 3 & 4, and Waiakoa to a forest reserve monument at a point called "Kohe" on the boundary of Waiakoa and Kealahou 3 & 4, the coördinates of said monument referred to Government Survey Trig. Station "Puu-o-Kali" being 2553.0 feet North and 31751.1 feet East;
3. 315° 58' 6647.0 feet along the land of Kealahou 3 & 4 to a stone marked by an arrow cut on rocky ridge between two gulches;
4. 301° 43' 2830.0 feet along the land of Kealahou 3 & 4 to a pile of stones at the edge of a rocky gulch;
5. 307° 41' 6365.0 feet along the land of Kealahou 3 & 4 to a pile of stones on the boundary of Papaanui;
6. 67° 56' 7140.0 feet along the land of Papaanui to a pile of stones on top of mountain;
7. 53° 55' 3395.0 feet along the land of Papaanui to a cross cut on the rock over a sort of cave at a place called Kalepeamoa;
8. 61° 40' 12230.0 feet along the land of Papaanui;
9. 68° 03' 20" 1906.8 feet along the land of Papaanui to "Puu Keokea" Trig. Station marked by a 1½ inch galvanized pipe;
10. 329° 03' 30" 3121.8 feet across the land of Papaanui to a forest reserve monument at a place called "Kieiei" on the boundary of Papaanui and Kahikinui;
11. 83° 44' 3570.0 feet along the land of Auwahi in Kahikinui to a forest reserve monument in a cave;
12. 34° 21' 30" 3350.0 feet along the land of Auwahi to a forest reserve monument, said monument being by true azimuth and distance 214° 21' 30" 6990.0 feet from "Puu Ouli" Trig. Station;
13. 116° 45' 3090.0 feet across the land of Kamaio along Grant 4640 to J. H. Raymond to a forest reserve monument on the boundary of Kamaole and Paeahu;
14. 124° 13' 30" 1007.2 feet along the land of Paeahu to a forest reserve monument;
15. 204° 35' 2640.0 feet to a forest reserve monument;
16. 114° 35' 1320.0 feet to a forest reserve monument;
17. 204° 35' 1336.5 feet to a forest reserve monument;

18. 294° 35' 330.0 feet to a forest reserve monument;
 19. 204° 35' 3976.5 feet to the point of beginning.

Areas.

| | | |
|---|------|-------|
| Papaanui, Government land..... | 370 | Acres |
| Kamaole (Polipoli Spring), Government land..... | 612 | " |
| Waiohuli-Keokea Tract Government land..... | 2450 | " |
| Kaonoulu | 804 | " |
| Alae 1 & 2..... | 202 | " |
| Alae 3 & 4, Government land..... | 70 | " |
| Waiakoa, Government land..... | 1567 | " |
| Total | 6075 | " |

Very respectfully,

RALPH S. HOSMER,
 Superintendent of Forestry.

DIVISION OF FORESTRY.

Honolulu, Sept. 7, 1912.

Board of Commissioners of Agriculture and Forestry, Honolulu,
 T. H.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of August, 1912.

During the first ten days of August I was in Honolulu engaged in the preparation of reports upon, and with details in connection with certain forest reserve projects that came up for final action later in the month.

From August 10 to 24 I was on Kauai making a general inspection of forest conditions on that island and looking into a variety of forest matters. During my stay on Kauai I followed the forest reserve boundary from Waimea around to Hanalei, seeing in some detail many of the forest lands in the several reserves along the way. The remainder of the month I was on Oahu, occupied with work in the office and with one short trip, to Nanakuli and Honouliuli.

New Forest Reserves.

On August 26, a public hearing was held at the Government Nursery to consider the creation of two new forest reserves, respectively on the Island of Molokai and in the Kula District, Maui, and the addition of a small block of land to the existing Waianae-kai Forest Reserve on Oahu. A number of persons appeared in regard to the Molokai Reserve. After a full discussion, the Governor announced that he would sign proclamations creating that and the other two forest reserves.

The areas are as follows:

| Name. | Total area Acres | Gov't. land Acres | Per cent. |
|-------------------|---------------------|----------------------|-----------|
| Molokai | 44,674 | 13,268 | 30 |
| Kula | 6,075 | 5,069 | 83 |
| Waianae | 396 | 396 | 100 |
| Total | 51,145 | 18,733 | 100 |

These new reserves increase the total area of all the forest reserves in the Territory to 685,101 acres, of which 454,390 acres, 67 per cent., is government land.

Yearbooks.

In accordance with the usual custom, the Hon. J. K. Kalani-anaole, Delegate to Congress, has again had his quota of the Yearbook of the U. S. Department of Agriculture forwarded to this office for distribution. The books have been sent out to a carefully selected list of persons throughout the Territory. A few yet remain that may be had free, upon application to the mailing clerk, Board of Agriculture and Forestry, Box 207, Honolulu.

Orders for Seedlings.

Notwithstanding the long continued drought which has hindered a good deal of forest planting work, interest in tree planting in Hawaii seems to be decidedly on the gain. Recently there have been received a number of good sized orders for forest tree seedlings for planting this coming autumn and winter. One in particular deserves special mention, that from Waialua Plantation for 500,000 trees. Planting trees in such numbers as this is forest work that counts. The report of the Forest Nurseryman gives the details of this branch of the work of the Division of Forestry.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

NURSERYMAN'S REPORT.

Honolulu, Sept. 1, 1912.

R. S. Hosmer, Esq., Superintendent of Forestry, Honolulu, T. H.

Dear Sir:—I herewith submit a report of the principal work done during the month of August.

NURSERY.

Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold . . . . . | ..... | 150 | 188 | 338 |
| Gratis | 1500 | 2100 | 2035 | 5635 |
| | <hr/> 1500 | <hr/> 2250 | <hr/> 2223 | <hr/> 5973 |

Collections.

Collections on account of plants sold amounted to \$8.40.

Seed Collecting.

The Koa and a number of the Eucalyptus on Tantalus are now in season and the boys have been collecting there during the greater part of the month. The Koa seed is badly infested with the seed borer but I think we may be able to get a number of pounds of good seed.

Plantation Companies and Other Corporations.

Plants delivered:

1,500 transplants in boxes ready to set out

500 pot grown

10,000 seedlings in seed boxes

12,000

Orders received for plants to be delivered during the next six months:

12,000 Ironwood in transplant boxes ready to set out

500,000 Assorted Eucalyptus seedlings

The above orders came from the plantation companies.

Experiment Garden, Makiki.

Owing to the large number of tin cans which we have been receiving gratis from the cannery at Iwilei and which we are using to good advantage for setting of trees, we have found it necessary to erect a shed at Makiki to hold them and we have, with the aid of the men at the Nursery, put up a rough shed for that purpose. We have also made a machine for cutting the ends of the tins, thereby reducing the cost of labor considerably. With the machine one man can cut five tins in the same time that he could cut one with the ordinary can opener.

We are getting a large number of trees ready for the coming Arbor Day.

U. S. Experiment Planting, Nuuanu Valley.

Owing to the dry weather no planting has been done for several months, but we have a number of trees ready at Makiki and will plant them just as soon as the rain comes. The men have been hoeing and keeping the trees clean.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Sept. 12, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of August, 1912.

The importation of dogs remains about the same number of animals, that is from 16 to 20—as was found to be present at the end of the first four months, or, in other words, about an equal number is coming in as is going out. Unless, therefore, an unexpectedly large importation should come again, such as might accompany a new regiment of soldiers, it may be concluded that the quarantine station as now established will serve all present requirements.

The fifteen dogs which have been kept in quarantine at Schofield Barracks were released a few days ago, all of them being found sound when last inspected on the 5th inst. The temporary kennels which were built for the accommodation of these dogs were, after four months service, considerably the worse for wear and if future importations of dogs belonging to the various arms of the military service are to be granted the same privileges, that is, are to be quarantined at Schofield Barracks, or on military reservations, it would seem well for this Board to insist on the construction of quarantine quarters of a more permanent nature than those hitherto provided.

From official reports received at this office, as well as from newspaper reports, it appears that rabies is spreading constantly, having now invaded the State of Oregon and caused the promulgation of a muzzling act in Portland, which requires all dogs to be either muzzled or kept in leash if brought into the streets of that city.

By the S. S. Zealandia there arrived on the 10th inst. 3 dogs from New Zealand, the same being consigned to the Lanai Ranch. These dogs were accompanied by a certificate signed by the Director of the Division of Live Stock and Heat of the Department of Agriculture, Commerce and Tourists of the Dominion of New Zealand, to the effect that the disease of rabies does not exist in New Zealand and moreover has never been known to exist in that country. While the importer has made no application to this Board for a permit of importation it would seem that all other requirements of the rabies regulation have been complied with, and it is therefore recommended that the three dogs in question, which are detained at the local quarantine station pending the Board's decision, be allowed to proceed to their destination (Lanai) by the first available steamer, that is the "Mikahala" on September 17th.

Similarly, three other dogs are expected to arrive from Liverpool, England, within a few days. These dogs are also accompanied by certificates to the effect that rabies has not been known to exist in England for several years and the agents (Messrs. Schaefer & Co.) are anxious that the dogs should be allowed entrance to the Territory upon arrival without quarantine.

This, I believe, can safely be granted if the steamer carrying the dogs has not docked at any infected port since leaving Liverpool, or if such was the case that proper precautions were taken to prevent contact with other dogs while in port.

The swimming tank at the quarantine station has been practically finished, the delay being due to the illness of the contractor, Mr. Oss, whose bid of \$116 was accepted. The tank will undoubtedly add much to the welfare of the confined animals, many of which are feeling the continued hot weather badly, and it is hoped, will be able to find much relief by means of frequent immersions in the tank.

Tuberculin Testing.

As will be seen from the appended report of the Assistant Territorial Veterinarian, the tuberculin testing of dairy cattle on this island may be considered finished for the present time, or at least cannot be resumed until sufficient rain has fallen to allow of the handling of those range animals which have not yet been tested.

It might, therefore, be well to consider now whether this work is to be extended to the other islands, as recommended in previous reports.

From letters received from the Deputy Territorial Veterinarians on both Hawaii and Maui it would seem that there is a certain demand for the extension of this work, if the coöperation of this Board can be secured, or to put it plainly, if the work of testing can be undertaken by this Board. To do this properly would, in my opinion, require that either myself or my assistant

take actual charge of the work. It would, however, be necessary that the various counties where this is to be done should first pass a milk ordinance requiring the tuberculin testing of all dairy cattle from which milk is drawn for human consumption. It should also be ascertained what financial or other support can be expected from the counties enacting such an ordinance, especially as an automobile will be required for the use of the inspector and his assistant while the work is going on. The milk ordinance in effect in this county might, with a few alterations, be used as a basis for similar regulations elsewhere.

Quarantine Stations on Other Islands.

The selection of a site for a quarantine station on Hawaii was accomplished by a trip to Hilo during the beginning of August. The site is located on what is known as the Shipman slaughter-house pasture, near the entrance to the Waiakea Mill. The plans are all prepared and ready for advertising as soon as the new manager of the Waiakea Sugar Company takes charge and approves of the arrangement.

In regard to the Maui station, there are several locations offered to the Board, but a visit by myself to decide on which one to select will undoubtedly be advisable. The correspondence of Drs. Elliot and Fitzgerald, both in regard to the respective stations as well as to tuberculosis testing, is herewith appended.

I also append a copy of a report on the live stock industry of the Territory prepared at the request of Governor Frear.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

ASSISTANT VETERINARIAN'S REPORT.

Honolulu, September 1, 1912.

Dr. Victor A Norgaard,
Chief of Division of Animal Industry,
Board of Agriculture and Forestry,
Honolulu, T. H.

Sir:—I beg to submit herewith a report of the work for the month of August:

Tuberculosis Control.

The third general test of the dairy herds of the City and County of Honolulu is practically finished. The testing during the past month has been confined to two dairies, and is as follows:—

| August 1-3 | T. | P. | C. |
|------------------|----|----|----|
| P. M. Pond | 10 | 10 | 0 |
| John Souza | 2 | 2 | 0 |

A tabulated list of the various dairies visited and number of animals tested is given below, and from the figures it will be seen that a total of 5265 animals were subjected to the test, of which number 5067 passed and 198 condemned, giving a percentage of 3.76 of tuberculosis animals on the Island of Oahu. This is a gratifying improvement over last year's test, which showed a percentage of 5.36 of tuberculosis animals:

| | T. | P. | C. |
|------------------------------|-----|-----|----|
| 1. Wm. Gomes | 10 | 9 | 1 |
| 2. J. H. Cummings | 5 | 5 | 0 |
| 3. D. P. R. Isenberg | 337 | 312 | 25 |
| 4. Marshall & Azevedo | 28 | 26 | 2 |
| 5. P. M. Pond | 37 | 36 | 1 |
| 6. M. Gomes | 28 | 28 | 0 |
| 7. H. B. Brown | 13 | 13 | 0 |
| 8. S. J. Grace | 5 | 5 | 0 |
| 9. Capt. Hartman | 3 | 3 | 0 |
| 10. J. E. Faria | 20 | 20 | 0 |
| 11. R. Compos | 12 | 12 | 0 |
| 12. Frank Gouveira | 24 | 24 | 0 |
| 13. J. Quintal | 2 | 2 | 0 |
| 14. J. M. Whitney | 10 | 10 | 0 |
| 15. T. F. Farm | 45 | 42 | 3 |
| 16. Omai Tatsuiichi | 10 | 10 | 0 |
| 17. E. C. Krauss | 1 | 1 | 0 |
| 18. K. Inouye | 8 | 8 | 0 |
| 19. W. P. Alexander | 5 | 5 | 0 |
| 20. I. Nagaki | 15 | 15 | 0 |
| 21. J. H. Cummings | 4 | 4 | 0 |
| 22. Mrs. C. M. White | 10 | 9 | 1 |
| 23. Frank Medeiros | 12 | 12 | 0 |
| 24. P. Miyakawa | 13 | 13 | 0 |
| 25. J. Allencastro | 7 | 7 | 0 |
| 26. K. Yamashita | 7 | 6 | 1 |
| 27. S. Hiarata | 14 | 14 | 0 |
| 28. C. K. Quinn | 6 | 6 | 0 |
| 29. Chas. Frazer | 1 | 1 | 0 |
| 30. College of Hawaii | 15 | 15 | 0 |
| 31. H. E. Cooper | 15 | 15 | 0 |
| 32. Frank Andrade | 81 | 80 | 1 |
| 33. Kawaiabao Seminary | 15 | 15 | 0 |
| 34. Mrs. Mary Quintal | 8 | 8 | 0 |
| 35. S. Tsumoto | 9 | 9 | 0 |
| 36. M. Kawamura | 6 | 6 | 0 |
| 37. Mrs. W. W. Hall | 1 | 1 | 0 |
| 38. G. L. P. Robinson | 5 | 5 | 0 |
| 39. Frank Valph | 6 | 6 | 0 |
| 40. Chas. Bellina | 138 | 112 | 26 |
| 41. S. de Nobrega | 13 | 13 | 0 |
| 42. Oahu College | 12 | 12 | 0 |
| 43. Manuel Abreau | 3 | 3 | 0 |
| 44. John Rezants | 13 | 13 | 0 |
| 45. C. J. Day | 5 | 5 | 0 |
| 46. Geo. Wond | 18 | 18 | 0 |
| 47. Antone Pires | 8 | 8 | 0 |
| 48. Geo. Holt | 37 | 35 | 2 |
| 49. Kamehameha Schools | 44 | 42 | 2 |
| 50. W. E. Miles | 17 | 16 | 1 |

| | T. | P. | C. |
|---------------------------------|------|------|----|
| 51. Frank Correa | 13 | 12 | 1 |
| 52. Mrs. Mary Riedell..... | 10 | 9 | 1 |
| 53. Victornia Souza | 35 | 33 | 2 |
| 54. Alexander Young Dairy..... | 46 | 46 | 0 |
| 55. Desidero Tello | 2 | 2 | 0 |
| 56. John P. Mendonca..... | 10 | 10 | 0 |
| 57. L. C. Fernandez..... | 8 | 8 | 0 |
| 58. J. G. Silva | 4 | 4 | 0 |
| 59. A. Wilder | 2 | 1 | 1 |
| 60. Richard Kapena | 2 | 1 | 1 |
| 61. A. Tavash..... | 3 | 3 | 0 |
| 62. Mrs. E. Johnson..... | 2 | 2 | 0 |
| 63. S. M. Damon..... | 148 | 143 | 5 |
| 64. Galt & Carter..... | 13 | 13 | 0 |
| 65. M. Ota | 1 | 1 | 0 |
| 66. Chas. Bellina | 28 | 28 | 0 |
| 67. Chas. Lucas | 90 | 80 | 10 |
| 68. S. M. Damon..... | 182 | 178 | 4 |
| 69. P. M. Pond..... | 327 | 317 | 10 |
| 70. O. R. & L. Co..... | 1403 | 1390 | 13 |
| 71. Y. Ogawa | 4 | 4 | 0 |
| 72. J. A. Templeton..... | 37 | 35 | 2 |
| 73. Laie Plantation | 16 | 15 | 1 |
| 74. Industrial School | 48 | 48 | 0 |
| 75. F. S. Lyman..... | 17 | 17 | 0 |
| 76. E. K. Ellsworth..... | 1 | 1 | 0 |
| 77. J. Coonradt | 3 | 3 | 0 |
| 78. Waianae Ranch | 292 | 186 | 6 |
| 79. P. Isenberg | 129 | 116 | 13 |
| 80. Tom Quinn | 5 | 5 | 0 |
| 81. S. Boyama | 5 | 5 | 0 |
| 82. Y. Nakamura | 5 | 5 | 0 |
| 83. J. Schwank | 5 | 5 | 0 |
| 84. F. Johnson | 9 | 8 | 1 |
| 85. E. C. Smith..... | 9 | 8 | 1 |
| 86. I. Morioko | 22 | 19 | 1 |
| 87. R. McKeague | 4 | 4 | 0 |
| 88. I. Moniz | 2 | 2 | 0 |
| 89. A. Reis | 2 | 2 | 0 |
| 90. S. Tado | 9 | 9 | 0 |
| 91. K. Shimidsu | 2 | 2 | 0 |
| 92. C. E. Eckland..... | 2 | 2 | 0 |
| 93. T. Fugita | 2 | 2 | 0 |
| 94. N. Kimoto | 2 | 2 | 0 |
| 95. F. de Mello..... | 8 | 7 | 1 |
| 96. S. M. McKeever..... | 2 | 2 | 0 |
| 97. R. T. McGettigan..... | 2 | 2 | 0 |
| 98. H. Focke | 8 | 4 | 4 |
| 99. O. R. & L. Co..... | 597 | 593 | 4 |
| 100. Kaneohe Ranch | 102 | 94 | 8 |
| 101. Waimanalo Plantation | 28 | 28 | 0 |
| 102. Kanehameha Schools | 1 | 1 | 0 |
| 103. Joe Fernandez | 4 | 4 | 0 |
| 104. M. Riedell | 1 | 1 | 0 |
| 105. M. Kawamura | 3 | 3 | 0 |
| 106. S. J. Alleneastro..... | 1 | 1 | 0 |
| 107. J. W. McGuire..... | 11 | 11 | 0 |
| 108. J. Gouveira | 19 | 19 | 0 |
| 109. M. Gomes | 15 | 15 | 0 |
| 110. J. P. Mendonca..... | 1 | 1 | 0 |

| | T. | P. | C. |
|--------------------------|------------|------------|-----------|
| 111. M. Gomes | 6 | 6 | 0 |
| 112. Paul Isenberg | 2 | 2 | 0 |
| 113. Paul Isenberg | 182 | 163 | 19 |
| 114. Paul Isenberg | 138 | 120 | 18 |
| 115. P. M. Pond | 10 | 10 | 0 |
| 116. John Souza | 2 | 2 | 0 |
| | <hr/> 5265 | <hr/> 5067 | <hr/> 198 |

Inspection Service.

During the past month seven trips were taken to Schofield Barracks for the purpose of inspecting the dogs quarantined there. Everything was found to be in as good order as could be expected from the temporary nature of the quarantine pens.

On the first trip, August 2, Captain Apple's dog was released from quarantine, the required one hundred and twenty days having expired on that date. The dog was delivered to the owner in excellent physical condition.

Port Inspection.

The following vessels arrived at the port of Honolulu with live stock:

- August 1—S. S. Korea, San Francisco; 1 cat, 4 cts. poultry.
- August 5—S. S. Ventura, San Francisco, 1 ct. poultry.
- August 6—S. S. Wilhelmina, San Francisco, 5 cts. poultry.
- August 13—S. S. Makura, Sydney, 1 dog, Duke Johnson.
- August 13—S. S. Chiyo Maru, Orient, 1 ct. chix.
- August 14—S. S. Honolulan, San Francisco, 18 Holstein heifers, 1 Holstein calf, 4 brood mares, 6 Shrop. rams, Paul Isenberg; 2 Holstein bulls, Haw. Meat Co.; 1 dog, B. C. Wilson; 9 cts. poultry.
- August 16—S. S. Siberia, San Francisco, 3 cts. Psuff Ply rocks.
- August 19—S. S. Sierra, San Francisco, 10 cts. poultry.
- August 28—S. S. Lurline, San Francisco, 11 cts. poultry; 1 dog (Mr. Fitzgerald of Maui), dog quarantined in Honolulu for the required 120 days.
- August 29—S. S. Mongolia, San Francisco, 3 cts. poultry.

Respectfully submitted.

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, August 31, 1912.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of August as follows:

During the month there arrived 36 vessels, of which 20 carried vegetable matter and one vessel sand. The usual careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 1,040 | 17,200 |
| Fumigated or otherwise treated..... | 6 | 36 |
| Burned | 22 | 55 |
| Total inspected | 1,068 | 17,291 |

Rice Shipments.

Twenty-two thousand eight hundred and nine bags arrived from Japan during the month and all was accompanied with certificates of fumigation. After thorough inspection the shipments were passed as free from pests. In this connection I beg to report that during last season we found some bean shipments infested with the rice moth and thought at that time that the infestation was caused by the shipment being in contact with the infested rice shipments. However, this season we again found a small shipment of beans infested, and as all rice shipments had been fumigated and found free from pests, we now have requested the fumigation of all bean shipments under government supervision before taken for shipment at Kobe or other Japanese ports. The Japanese Merchants' Association has taken the matter up with their government, and I don't anticipate any further trouble.

Pests Intercepted.

Thirty packages of fruit and 25 packages of vegetables were confiscated from passengers and immigrants during the month. One package of seeds from Sydney was found infested with weevils (*Calandria linearis*). One package of seeds (*Balanocarpus maximus*) were so badly infested with *Scolytid* beetles that hardly a single seed was free from the pest: the package was fumigated for 24 hours and then all was destroyed by burning. One *Hydrangea* from the mainland was badly infested with *Bryobia* sp., a common red spider, and was thoroughly fumigated before delivery. The common house ant (*Monomorium pharaonis*) was found in the baggage of an immigrant from Yokohama.

Beneficial Insects.

We distributed 18 lots of Japanese beetle fungus to various applicants. This pest is not as bad as last season, although some sections seem to favor the increase of the beetle more than others.

Hilo Inspection.

Brother Matthias Newell reports the arrival of six vessels at Hilo, of which three brought vegetable matter, consisting of 74 lots and 1,116 packages, which were passed as free from pests.

Inter-Island Inspection.

During the month of August, 60 steamers were attended to, and the following shipments were passed:

- 56 cases plants.
- 473 bags taro.
- 11 bags cocoanuts.
- 7 packages fruit.
- 2 cases sugar cane.

Total 549 packages inspected and passed.

The following packages were refused shipment:

- 42 packages of fruit.
- 3 packages of vegetables.
- 8 packages of plants infested and carrying soil.

Total 53 packages inspected and refused shipment.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

THE FRUIT FLY CAMPAIGN.

Report of Committee on Entomology.

Honolulu, September 12, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—The Executive Officer of the Board has called the attention of your Committee on Entomology to the following facts, viz.:

1st. The "Agricultural Bill" as passed by the last Congress provides the sum of \$35,000 for the "Investigation of the Mediterranean fruit fly in the United States, its territories and possessions, said sum being immediately available for the purpose named."

2nd. As a result of said appropriation, the Secretary of Agriculture has authorized an investigation of the Mediterranean fruit fly in this Territory, together with such expenditures as may be necessary in connection therewith, the said investigation to be conducted under the supervision of the Bureau of Entomology, Washington, D. C.

3rd. Dr. E. A. Back, of the U. S. Department of Agriculture, arrived in Honolulu on the 29th ultimo bearing a commission from the Secretary of Agriculture and under instructions from the Chief of the Bureau of Entomology, his object being to direct the expenditure of the federal appropriation referred to on such lines as may be not only of benefit to Honolulu and adjacent territory, but also as a means of protection to the mainland.

4th. Doctor Back has instructions from the chief of his department to avail himself of the coöperation of the Territorial Board of Agriculture in his proposed line of investigation and control, and both he and Mr. Marlatt, the assistant chief of the Bureau of Entomology, have asked for such coöperation and assistance as your Board may be able to offer.

5th. As a result of the federal appropriation, the California State Horticultural Commissioner has notified your executive officer that financial assistance will no longer be required by the Territory from the State of California, and proposed to withdraw such assistance as of September 1, 1912.

In view of the facts above mentioned, your committee makes the following recommendations, to wit:

(1) That the direction of the fruit fly control by artificial means, as already organized and operated by the Territorial Board of Agriculture and Forestry, be assigned to Dr. E. A. Back, as its special agent, and that the president and executive officer be authorized to commission Dr. Back as said special agent for the purpose named, the said assignment and commission to be dated as of September 15, 1912.

(2) That the president and executive officer be authorized to allow the balance of the Territorial appropriation for combating the fruit fly by artificial means to be expended under and by direction of Dr. E. A. Back, as special agent in coöperation with the Territorial Board of Agriculture and Forestry, or its executive officer.

(3) That the use of a portion of the premises, now partly occupied by the offices and laboratories of the Board, be tendered to Dr. Back for such purpose as he may deem necessary in connection with the work to which he has been assigned by the U. S. Bureau of Entomology.

(4) That your executive officer be authorized to officially acquiesce in the proposal of the California State Horticultural Com-

missioner that financial assistance be withdrawn as of September 1, 1912.

Respectfully submitted,

W. M. GIFFARD, Chairman;
ALBERT WATERHOUSE,
J. M. DOWSETT,
Committee on Entomology,
Board of Agriculture and Forestry, T. H.

Letter from President.

Honolulu, September 9, 1912.

To the Commissioners of the Board of Agriculture and Forestry,
Honolulu.

Gentlemen:—I have to report that the recent United States Congress enacted a Federal law to regulate the importation into any State or Territory of any nursery stock and other plant products, to permit and regulate the movement of fruits, plants and vegetables therefrom and to establish and maintain quarantine districts for plant diseases and insect pests.

I am informed that this new Federal quarantine law will permit the continuance of the present exportation of bananas and pines to mainland ports, providing that these fruits undergo the customary inspection before shipment and are found to be free from attack of insect pests. As regards other fruits and vegetables which at present are not allowed export to coast ports, it has been intimated by the representatives of the U. S. Department of Agriculture that if after careful investigation certain varieties of these are demonstrated to be free from attack or infestation, the quarantine on such will be lifted.

I am personally informed by Mr. C. L. Marlatt, the assistant chief of the Bureau of Entomology and chairman of the Federal Horticultural Board, that he has recommended to the Secretary of Agriculture that the inspection of bananas and pines intended for export to Pacific Coast ports be placed in charge of Dr. E. A. Back as soon as the quarantine has been officially promulgated. The promulgation will be in effect on or before September 15, and in the meantime will be continued as at present by representatives of the California State Horticultural Board and of the Marketing Division of the Territorial Bureau of Immigration, Labor and Statistics. After the above date the aforesaid Territorial and California State officials will no longer, as such, attend to, or assist in, the inspection of exportations of fruits and vegetables to the mainland.

I am further informed by Mr. Marlatt, as chairman of the Federal Horticultural Board, that he will recommend to the Sec-

retary of Agriculture the appointment of the Territorial Superintendent of Entomology and his assistants as deputy quarantine plant inspectors under the new law in order that the duties of Territorial and Federal inspection of imported nursery stock, fruits, etc., may be combined, thereby preventing duplication and overlapping of government work.

Respectfully submitted,

W. M. GIFFARD,
President and Executive Officer,
Board of Agriculture and Forestry, T. H.

FORESTRY AS A PROFESSION.

The increasing demand for the practice of Forestry throughout the United States on both public and private lands is the result of the rapid depletion of our forests. Changes in methods of lumbering, better forest fire protection, and the reforestation of denuded areas are urgently needed, if there is to be a timber supply in the future, and if the sources of the waters now used for domestic purposes, power and irrigation are to be protected.

No profession offers greater opportunities for individual success through public service than Forestry. Yet success in this work can be won only by conscientious and unstinted devotion. The discomforts due to weather or isolation in the field test unflinchingly the forester's capacity for success.

Forestry should not be selected as a profession except by those with enthusiasm for the work and with sound health. No man can expect to prepare himself for Forestry unless he is ready for the hard study which masters detail and for the rough life of the woods. A thoroughly trained forester must have complete detailed knowledge of his subject and abundant drill in its methods.
—Colorado College Publication.

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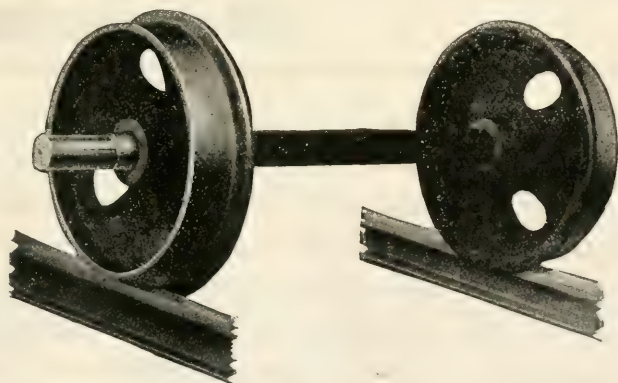
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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits & Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
 "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1, 3 pp.; 1905.
 * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
 "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
 "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
 * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
 "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
 "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
 "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
 Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
 * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
 Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
 Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
 Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
 ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
 * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
 "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
 "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
 Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
 Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
 Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
 Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
 Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
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 Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
 * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
 * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
 * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
 * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
 "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws, 11 pp.; unnumbered pamphlet; Revised 1910.
 Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
 Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
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 Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
 Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

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OCTOBER, 1912.

No. 10.

An article on "Flowers of the Papaya" in the August number of the Forester should have been credited to the Agricultural News (West Indies), as it was a translation specially prepared for that paper.

Tropical Life (London) commends to all interested in the cane sugar industry a book called "The World's Sugar Industry—Past and Present," by H. C. Prinsen Geerlig. It contains 400 pages including index, and is published by Norman Rodger, Altrincham, Manchester, price 12s. net or 14s. post free.

Dr. Norgaard's reports in this issue deserve wide publicity, particularly the section devoted to human and bovine tuberculosis. There is no subject of more vital importance to the human race at the present day. The passage of the milk ordinance by the Honolulu supervisors, prohibiting the distribution of milk from cows uncertified as free from taint of tuberculosis, marked an era in the fight against the great white plague in Hawaii. It is not to the credit of the other counties of the Territory, or the legislature, that similar measures have not been provided to cover the rest of the islands. Territorial action is necessary to back up any county measure of this kind, by way of providing for the expenses of administering the test to cattle. With regard to Oahu, the expense was less than it would be on the other islands, as the departmental experts were more available here and travel a more simple problem, so that a moderate amount of assistance from the municipal treasury enabled the division of animal industry to take up the work of eradicating tuberculosis from the dairy herds of this island—a work which, happily, has been continued until the Territorial veterinarian is able to report it practically completed.

"Official Ayreshire Record No. 14" comes from C. M. Winslow, secretary of the Ayreshire Breeders' Association, Brandon, Vermont. There are eleven cows in the two-year-old form and the one standing highest is White Lilly of South Farm, John Sherwin, owner, her record being 12,022 lbs. milk, 503.88 lbs. fat, 588 lbs. butter and 4.19% fat. The lowest of the eleven in this form is Howie's Flora Macdonald, with 6320 lbs. milk, 271.55

lbs. fat, 317 lbs. butter and 4.3% fat. Of five in the three-year-old form, Langdyke Sally 2nd, owned by Geo. H. McFadden, is second, with 12,925 lbs. milk, 457.14 lbs. fat, 533 lbs. butter and 3.54% fat. In the four-year-old form there are eight cows, the leader being Mabel of Sand Hill, owned by S. S. Karr & Son, with 13,362 lbs. milk, 492.42 lbs. fat, 575 lbs. butter and 3.69% fat. The mature form contains six names, the best being College Maud, Kansas Agricultural College, owner, with 13,727 lbs. milk, 533.29 lbs. fat, 622 lbs. butter and 3.88% fat. These are the averages: Two-year-old form, 8717 lbs. milk, 353.06 lbs. fat, 412 lbs. butter and 4.05% fat; three-year-old form, 10,079 lbs. milk, 381.26 lbs. fat, 445 lbs. butter and 3.78% fat; four-year-old form, 10,560 lbs. milk, 424.10 lbs. fat, 495 lbs. butter and 4.02% fat; mature form, 10,977 lbs. milk, 420.62 lbs. fat, 491 lbs. butter and 3.83% fat; the whole, cows and heifers, 9888 lbs. milk, 390.22 lbs. fat, 455 lbs. butter and 3.95% fat. The leaflet says: "We are pleased to find that our claim that there are many great milkers in many of the Ayreshire herds is more and more proving true, as new herds are submitted to advanced registry tests. We believe that the Ayreshire breed will show a larger percent of profitable dairy cows than any of the other dairy breeds, and will show a higher average production, at less cost for food consumed."

The following cheerful statement of the rubber situation is from *Tropical Life* for September:

"The position disclosed by Hecht's Annual Statistics is a most satisfactory one. For the twelve months ended June 30, 1912, the world's production of rubber is given as 93,669 tons, as compared with 79,302 tons in the previous year. The total consumption, on the other hand, is returned at 99,564 tons, as against 74,082, an increase of 25,482 tons. The world's stocks of rubber on July 1 are put at 10,181 tons, as against 12,563 tons on the same date in 1911. The considerable expansion in consumption for 1911-12 is attributed largely to the lower level of prices prevailing during the year. This is, of course, a very healthy state of things, and people interested in rubber planting can hardly wish for anything more beneficial in the long run than the maintenance of the present steady prices for the raw material. With rubber at or below 5s. per lb., such an expansion of demand may be looked for as will completely absorb all increased supplies, and establish the planting industry upon a thoroughly sound basis, while enabling well-managed estates to pay quite remarkable dividends. It is interesting to note that (according to figures given by Messrs. Gow, Wilson and Stanton) for the first seven months of the current year the average price of plantation rubber is a fraction over 4s. 11d. per lb. compared with just over 5s. 3d. per lb. for the same period last year, that is to say, only 4d. per lb. less. This, in face of the increased yields, is good."

TERMITES AND WOOD PRESERVING.

(From Tropical Life for September.)

The depredations of Termites and the means of combating them constitute an ever-present problem to planters in the tropical zone; one also which occupies a great deal of the attention of the scientists whose lifework is the study of tropical conditions in agriculture and hygiene. The most interesting contribution to our knowledge on this important subject which has appeared for some time is an article in the July issue of the Agricultural Journal of India by Mr. T. Bainbrigge Fletcher, R. N., F. E. S., F. Z. S., Entomologist to the Government of Madras.

Mr. Fletcher premises his article by taking exception to the popular term "White Ant" in speaking of Termites, for, as he says, the "White Ant" is not an ant at all, and not necessarily white. He then proceeds to show that in the entomological sense Termites belong to quite a different order to true ants, and have very little in common therewith, except in their social habits and caste system. The steps by which knowledge is gained of the differentiation of the very large number of species of this insect, their geographical location, and peculiar habits and activities may be of little interest to the practical planter; but the summarized results of such patient investigation are invaluable in assisting him to safeguard his property, whether it be growing crops or wooden structures of any description that are exposed to attack.

Perhaps the most remarkable information in Mr. Fletcher's interesting article is that relating to the extraordinary reproductive power of Termites, of which the following may be quoted:

"A female of *Termes* Sp. taken from a mound at Toshangabad and placed under as natural conditions as possible, was found to have laid 359 eggs in fifteen minutes, a rate of oviposition which works out roughly at 34,000 per day."

Whilst the longevity of the female is quite unknown, it is suggested as being probably not less than five years, and possibly extending to more than double that time. Considering these points, it is unquestionable that, notwithstanding the heavy depletion of the ranks by natural enemies, the rate of increase is such as to create a serious menace in cultivated or commercial and shipping areas unless adequate means of protection are adopted. The destructive activity of the species *T. gestroi* on the rubber estates of the Malay Peninsula is a striking example of this.

Mr. Fletcher's article is accompanied by a fine colored plate illustrating a full-grown queen and workers at different stages.

The safeguarding of growing crops from Termite attacks is, of course, a wide subject in itself, and is being exhaustively dealt with in various parts of the world, according to the special

local conditions. However, it is with the protection of buildings and the preservation of woodwork generally that we are here generally concerned; and a few points on the efficient and economical treatment of timber may be worth bringing forward. The efficient preservation of woodwork is necessarily of more pressing importance in Termite infested countries than in the temperate zones where timber is for the most part only subject to the slower processes of bacteriological decay and not exposed to the attacks of such voracious insects, the destructive powers of which are startling in their rapidity.

The basis of all processes of preservation is the impregnation of the wood fibres with some antiseptic material toxic to living organisms. The means to accomplish this end are various, but may be broadly classified under three headings: (1) The pressure or combined vacuum and pressure method; (2) the open tank method; (3) the brush method.

For the practical planter the first method is out of the question on the point of the cost of the special plant necessary for transportation of the timber to some large centre where such a plant may exist.

The open tank, or immersion method, however, calls for some detailed consideration, as the only equipment absolutely necessary is any available watertight receptacle of sufficient length to take the timbers to be treated. Where time is no object the immersion of the timber in a cold preservative solution for a period of anything up to three or four days will ensure sufficient impregnation. Given, however, facilities for heating the solution, the treatment with any preservative can be greatly accelerated. Where such facilities exist, however, the quickest and most effective results can be obtained by immersing the timber, heating the solution up, and maintaining it at a temperature of 180° F. to 200° F. for half the total time for which the timber is to be immersed. The solution should then be allowed to cool for the remainder of the time before the timber is to be removed. The underlying principle of this operation is that the preliminary heating of the solution has the effect of expelling the air from the timber and expanding the wood cells. As the cooling proceeds a partial vacuum is produced, so that the preservative solution fills the cellular spaces from which the air has been displaced. The manufacturers of the well-known Atlas "A" Wood Preservative have carried out tests with railway sleepers, from which it has been determined that timber immersed for twelve hours in a solution heated for six hours and allowed to cool for the remainder of the time will absorb a greater percentage by weight of the preservative than similar timber immersed for twenty-four hours heated continuously for the whole period.

Under no circumstances can such thorough impregnation be obtained by the brush method as by immersion; but in many instances where sundry small quantities of timber have to be

dealt with at irregular intervals, painting the surfaces with a reliable, well-proved preservative material will ensure, at a nominal cost, sufficient prolongation of life and immunity from Termites to meet the requirements in view. A good alternative to brushing the preservative over the surfaces when a quantity of light timber is to be dealt with is to apply the solution by means of sprayers or rose watering cans. This can be effectively accomplished with the minimum wastage by laying, say, six planks close together side by side as a "floor." Spray them, turn them over, and spray the other side; lay a second "floor" of six planks directly on top, spray them, turn over, and spray the other side; lay the third "floor," and so on until a convenient height is reached. The timber should be left close stacked in the shade in this way for three to six days to allow the solution in contact to penetrate before opening out to dry. Whilst, of course, this is a quick and handy method for dealing with a quantity of anything up to 1½ in. planking, for heavier timbers open tank immersion is the most efficient method to secure the full benefit of any preservative material that may be used.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Oct. 7, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I have the honor to submit herewith my report as Territorial veterinarian for the month of September, together with such reports, communications and letters from assistant and deputy Territorial veterinarians and others pertaining to the work of the Division of Animal Industry. In order to facilitate action and when possible find disposition of plans for future work and recommendations pertaining to the service, it has struck me that it might be well to deal with each subject on a separate sheet or sheets, thereby obviating the necessity of keeping more than the unfinished part of the report on hand and allowing of the immediate filing of accepted or approved parts. If this plan meets with the approval of the Board, it will be adhered to in the future.

This report deals with the following subjects:

1. Human and Bovine Tuberculosis.
2. Quarantine Stations.
3. Regulations for Quarantine Station.
4. Letters and correspondence.
5. Island Horses for the U. S. Cavalry.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

HUMAN AND BOVINE TUBERCULOSIS.

Four years ago I had the honor to represent this Board as a delegate to the Ninth International Tuberculosis Congress, held at Washington, D. C.

As a result thereof I do not hesitate to say that the City and County of Honolulu is today practically free from bovine tuberculosis, and that the milk supply of Honolulu has been improved a hundred fold, and is today on a par with the best that is to be found anywhere. Thereby is not meant that it is perfect, far from it, as will be shown, but what in most places is considered an insurmountable obstacle, something to avoid or shirk or circumvent, that is, the eradication of tuberculosis from the dairy herds, has been accomplished in *one* of the counties of the Territory, and has demonstrated that the same can be done in the entire group.

The principal reason why I am taking this subject up at some length in this report is that two of my deputies, on Hawaii and Maui, are both of the opinion that tuberculosis has recently begun to spread at a much increased rate among the dairy herds in their respective districts, and further, that I have every reason to believe that had the work of eradication been delayed or deferred even one year longer here, we should have found conditions which it would have been impossible to tackle without extraordinary means and measures.

There have been times during the past four years when I have been in doubt as to the advisability or the justice of the policy adhered to, that is, the absolute and uncompromising eradication of the disease, the toleration not even of a single reacting animal on premises where milk is produced for human consumption, but I am happy to say that, as the reports on similar work done in other States, Territories or foreign countries are received, it has become more and more certain that under conditions like those which obtain here there can be no procrastination, no dilatory methods—that if we were to conquer the disease here, it could be only by way of the slaughter house and not by any “Bang,” “Ostertag” or “Birmingham” or any other method of eradication.

The preliminary reports of the Tenth International Tuberculosis Congress, held at Rome this summer, have just come to hand.

As in the previous meeting, the most important question was of human and bovine tuberculosis in their relation to each other. Only Prof. Koch was not there any longer to defend his ultra-radical views on the subject and more definite conclusions were agreed on. Every civilized country in the world was represented, there being more than 3,000 attendants. One of the most interesting papers was by Prof. Calmette, who, among many other things, mentioned (1) that judging from their appearance under the microscope the human and the bovine type of the tubercle bacillus cannot be definitely differentiated; (2) nor does culture methods distinguish them absolutely from each other; but (3) by

inoculation into various kinds of animals and especially into cattle proves more definitely which is which; (4) that the bovine bacillus is far more virulent or fatal to all mammals than the human form of the bacillus, except to the monkey, which is equally susceptible to both types; (5) that cattle cannot be infected, except locally, by inoculation with even very large doses of the human type; (6) that the bovine type, after sojourn for years in a human being, adapts itself to the appearance of the human type; (7) that in children who die from generalized tuberculosis, between the ages of 0 to 5 years, not less than 26.5 per cent show the presence of tubercle bacilli of the bovine type; (8) that between the ages of 5 to 16 years the same percentage is 25; (9) that above this age the percentage falls rapidly, as low as to 1.5 per cent, but whether this is due to transformation from the bovine to the human type, or due to direct infection from human being to human being through cohabitation cannot often be determined; (10) that it is an undeniable fact that below 16 years nearly 75 per cent of all children dying from tuberculosis show the presence only of the human type and above that age the percentage of fatal cases due to the human bacillus is 98.36. From which it is clear that for the suppression of human tuberculosis we must first prevent its transmission from one human being to another, but at the same time prevent the infection of children with the highly virulent bovine bacillus from the milk of tuberculous cattle.

Prof. Sims Woodhead of the Royal Tuberculosis Commission of England showed conclusively that about 20 per cent of tuberculosis in children was due to infection with the bovine bacillus; and Dr. Nathan Raw of Liverpool after confirming most of the above statements estimated that in Great Britain 15 per cent of all children who die from tuberculosis under the age of 12 years become infected with the bovine bacillus from milk. He proved by statistics that in countries where milk is boiled the amount of surgical tuberculosis in children (scrofulosis) is smaller, and he stated that with the vigorous inspection of dairy cattle the amount of surgical tuberculosis in children in Liverpool during the last ten years has, in his own hospital experience, been reduced by about 35 per cent. When we consider that this "vigorous inspection of dairy cattle in Liverpool" consists in the weeding out of "lungers" by physical examination, not by the tuberculin test, there is reason to believe that the percentage could be largely increased if our method were adopted.

However, the Italian Tuberculosis Congress clearly demonstrated, that the danger of bovine infection is now being widely recognized, the only difference of opinion now being as to the amount of such infection, and there can be little doubt that many countries will shortly adopt vigorous measures for its suppression.

In this connection I would mention the Congress of the Royal Sanitary Institute of Great Britain held at York, England, during the beginning of August this year. At this meeting Prof. Dewar

of the University of Edinburgh made an address on the subject of the tuberculous cow and what to do with it, from which I shall quote a few sentences merely to illustrate that what they are beginning to think about in England has been not alone thought about but carried into effect in this community, at least.

Prof. Dewar starts by discussing the vastly improved conditions of animal life and the prevention of animal diseases during recent years, but recalls that these, though very desirable and beneficent in themselves, are nevertheless merely the means to an end. It is in the relation which these questions bear to the improvement of the health of the community and in their preservation of human life that they mainly derive their importance. The prevalence of tuberculosis among the herds in Great Britain is admitted and while the dangers arising from the use of meat and milk from tuberculous animals is acknowledged to be less than was at one time believed, few, if any, will dispute their existence "and in the case of children and delicate or weakly individuals using raw milk the risk is a terribly real one."

Regarding the inaction of the Government in connection therewith he says: "For more than twenty years now (since Aug. 12, 1889,) the supervision of the health of the live stock of the farm has been committed to the care of a special Government Department and although that department has looked quietly on while tuberculosis was killing not only its thousands, but its tens of thousands annually without so much as moving a finger to prevent the spread of the disease, that is no reason why the department should not begin to move at last and do something by way of honest endeavor for the protection and improvement of the health of the live stock of the country. Perhaps our profession is not altogether guiltless in that it has not done more to educate the public regarding the terribly serious nature and the extent of the disease. We ought to insist, in season and out of season, that something should be done, that some attempt should be made to arrest the progress of this terrible scourge."

That is what the Division of Animal Industry has done for five years past and that is why we stand today where we do, thanks to the unflinching approval and backing of the board.

Prof. Dewar goes on to say that on June 14th this year the Scottish Chamber of Agriculture held a conference at Perth, at which a resolution "was stated to have been unanimously passed," demanding Government compensation for the tuberculous dairy cow, i. e., that instead of merely ordering the cow out of the byre, she should be condemned to be slaughtered, and compensation paid for her. Whether this "demand" bore any fruits is not known but the fact remains that the idea was a good one, as has been demonstrated here. To leave a tuberculous animal alive is simply to leave a center of infection, as isolation or segregation is an impossibility except in a government quarantine station.

That we succeeded in exterminating nearly one thousand tuber-

culous animals without paying any compensation was due in a great measure to the education of the dairy men up to the point where they realized that the sooner they cleaned up their herds, the smaller the loss would be. Besides this we were fortunate enough to find in the Revised Statutes an old law which makes it a misdemeanor to sell or otherwise dispose of an animal known to be affected with a disease transmissible to man. As all reacting animals are branded immediately with an official registered brand, known to everybody, it is not easy to dispose of or even keep on the premises a tuberculous animal.

Prof. Dewar further states that tuberculosis in cattle, owing to its great prevalence, cannot be dealt with like other infectious diseases. It would not only upset the dairy industry, but the live stock industry and other collateral industries in interfering seriously with the country's food supply.

The same was claimed here and a milk famine was predicted when suddenly more than twenty per cent of the milch cows in the district were declared tuberculous. Pasteurization, however, came to the rescue and the milk famine vanished. That proved one of the greatest blessings for the general health of this community, as the necessity for pasteurization resulted in a reorganization of the Dairymen's Association and the installation of a large modern electric milk purifying plant, which proved so absolutely satisfactory that even after all the tuberculous cows had been slaughtered, its use was continued, and at least 75 per cent of the milk consumed in Honolulu today is passed through it and reaches the consumer with less than 1000 bacteria per c. c.

In this connection it is worth mentioning that the Chief of the Federal Bureau of Animal Industry sounds an earnest warning against the use of un-Pasteurized milk, the same being based upon the fact that it has been definitely proven that the bacillus of infectious abortion is frequently found in commercial milk originating on farms where this disease occurs, not less than 11 per cent of all samples examined having been found contaminated with it. While it has not been definitely proven to be pathogenic to human beings, it is more than likely that it is, as it causes severe lesions in a variety of domestic and other animals.

When to this is added that the prolonged drouth which has prevailed here has been responsible for an unusual amount of dirt in the commercial milk in Honolulu and that the disease in question—infectious abortion—is known to exist here, then there is every reason for taking such precautions as may add to the safety of milk as a food, especially for children, and among these Pasteurization ranks as number one, whether the home or commercial variety.

The price of commercially Pasteurized milk in Honolulu has recently been raised to 12 cents per quart, but frequent bacteriological examination of this milk (see the appended report of the Assistant Territorial Veterinarian) as compared to the untreated

commercial article has fully demonstrated the absolute safety of the product, which at the same time due to the special process of Pasteurization has retained the taste, appearance, nutritive value and digestibility of fresh raw milk. It is, therefore, to be hoped that in some near future the entire milk supply of the city, at least, may be subjected to some process of purification similar to that now applied to the greater quantity now consumed here. An examination of Dr. Case's appended report will show that some of the producers of the samples examined could be prosecuted for selling impure milk, containing, as they do, a larger number of micro organisms than by law allowed, but I have personally examined some of the dairies from which these samples were obtained and found the premises and the milking methods so nearly perfect and the owners so anxious to comply with all regulations that I feel constrained to believe that the present high number of bacteria must be due to the drouth and the resultant amount of dust in the air.

But taken altogether the improvement in the local milk supply which has resulted directly from the eradication of tuberculosis from the herds,—not alone on account of the removal of the diseased animals, but to a very great extent also from the enforcement of the provisions of the Milk Ordinance incidental upon the repeated visits of the inspecting and testing officers (the city milk inspector always accompanies the testing inspector)—can hardly be conceived and must without doubt have contributed greatly to the general health of the community.

When to this is added that outside of the purchase of an automobile, which would have been required anyhow, no special expenditure or appropriation has been required, that in fact this Division, in spite of increased duties, is doing all the work with one \$1200.00 officer less than during the preceding biennial period, then it seems to me *that there is every reason for the extension of this work to the entire Territory.*

Reverting to the transmissibility of bovine tuberculosis to human beings, and especially to children, and at the same time remembering the appalling prevalence of tuberculosis among the population here, and especially among the natives—more than twenty-five per cent of all cases of generalized tuberculosis among children under 16 years being due to the bovine type of tubercle bacilli, that is, tuberculosis introduced by milk from tuberculous cows, then it appears to me indefensible to allow a single tuberculous animal to remain in the Islands since it has been demonstrated conclusively that the disease can be eradicated.

In the estimates of expenditures of the Division of Animal Industry for the present year I asked for \$3,000.00 for the extension of the bovine tuberculosis work to the other islands. As I am informed that no money is available for the purpose, I would respectfully suggest, in case the Board approves of the proposed work and so long as the sum required is insignificant in compari-

son to the human lives which may be conserved, that possibly the means can be obtained from other sources. The last Legislature, for instance, appropriated \$25,000.00 for tuberculosis work. If all of this money has not been expended, I can see no better way to do it than by assisting in exterminating the only known source of human infection, which can be exterminated.

In concluding this subject, the aim and object of which is the *complete eradication of bovine tuberculosis from the Territory of Hawaii*, a subject which has hitherto met with the unqualified approval and encouragement of the members of this Board, I beg to quote the last paragraph of Section V of the Recommendations of the Sanitary Commission (created under Act of the Legislature of 1911) and which reads:

"Third—That a heavy fine be imposed upon any person convicted of selling milk from cows infected with tuberculosis."

"Finally, especial attention is called to the recommendations of the Milk Commission of 1910—that the control of milk be taken from the municipality and given to the Territorial Board of Agriculture in order to secure protection for the whole Territory.—to insure an effective enforcement of regulations governing milk and its source of supply."

QUARANTINE STATIONS.

During the past month the attention of the Board was called to the constant deterioration of fences, posts, gates and feed racks, especially in enclosures where quarantined animals are kept with scant or insufficient food. The two largest enclosures are now in such a condition that animals cannot safely be placed in them. Less than a year ago one of these enclosures was entirely reconstructed, having been completely despoiled by mules being left in it without feed for some time.

As the rules of the Board decree that all expenses in connection with the quarantine of animals must be borne by the owner, and as the owner in this case, in spite of repeated assurances to the contrary, has neglected to repair the damages done by his animals, the matter is respectfully referred to the Board for action.

For the information of the Board, I would submit that the rules require imported animals to be quarantined on premises "provided by this Board" and that the owner may hold that the amount of feed he wishes to give them concerns nobody but himself; that idle work animals should be underfed; that all underfed animals will nibble at posts and boards, and that, consequently, the pens should have been constructed in such a way as to meet these contingencies. That the animals in this last case were neglected can be proved, the keeper having telephoned repeatedly for feed to be sent out and reported the conditions to the owner, but under ordinary circumstances it might prove difficult to establish just *when* the nibbling of a redwood post changes from a condiment to a

substitute for food. If it is held that the pens should be proof against the attack of horse teeth under all conditions and circumstances, then cement or concrete posts must take the place of the wooden ones, and boards and gates protected on all assailable corners and surfaces with sheet metal or wire.

The dog section is rapidly nearing completion, as owing to the small number of inmates, thirteen at the present, the keeper has had considerable time to devote to painting. During the month one consignment of three bull dogs arrived from England and was admitted to the Territory without quarantine. This was due to the fact that a permit to import them had been applied for and granted six months ago, England being officially recognized as free from rabies. A certificate to that effect accompanied the animals and as the steamer bringing them had not touched at any port on its way here from Liverpool, the dogs were entitled to free entry in accordance with Rule VI of this Division.

In regard to the future arrival of dogs belonging to officers or enlisted men of the U. S. forces stationed here, as well as to theatrical companies or other owners of performing dogs, I would respectfully suggest that the Board express an official opinion, by motion or otherwise, to the effect that the term in Rule VI, pertaining to the quarantining of dogs "*on premises provided by this Board*" is in the future, to be interpreted to mean only the Board's quarantine station in Honolulu, unless the Board should decide to allow the new quarantine stations to be constructed at Hilo and Kahului to be provided with sections for dogs. As this question has already been brought up by the Maui deputy, an opinion at this time would be in order, since a change would require the amendment of the present rule, including the Governor's approval and advertising.

In regard to the Hilo quarantine station site, I am informed, as per appended letter, that the site has been granted and surveyed and that the plan is with the agents in this city.

When this is accepted by the Board, it will be necessary to rearrange the relative position of pens, alleys and sheds in the present plan, in accordance with the shape of the new site and to have new blue prints made for the use of the bidders and contractor.

As this will require some little time, I would suggest that I be directed to go to Maui and select the site for the station there, so that I may get to work on the plans for the same.

REGULATIONS FOR QUARANTINE STATIONS.

During the past month a set of rules to be posted at the Quarantine Station and pertaining to the admission of visitors and regulating the actions of owners of quarantined stock while on the premises was submitted for the action of the Board, and is still awaiting the same. As the keeper is constantly complaining

about being unable to properly care for the stock without certain restrictions being placed on owners and visitors, the approval of the Board of the recommended rules is respectfully requested. Copies of the same are herewith appended.

ISLAND HORSES FOR THE U. S. CAVALRY.

A transaction of considerable import to the local live stock industry took place last week when a considerable number of island bred horses were purchased for cavalry mounts to be used by the forces stationed here. Though the matter has been under consideration for a long time and was highly recommended by the officers stationed here and who had learned to appreciate the high-spirited surefooted native horses, it seemed that there were insurmountable obstacles emanating from elsewhere, until suddenly the barriers were let down. The horses purchased were all bred on the Parker Ranch on Hawaii and it is confidently expected that these horses will prove so satisfactory as to establish a demand for many more at remunerative prices. As a regiment is rarely stationed in one place more than two or three years and always take their mounts with them when moved, there seems, as stated, to be brighter times ahead for the horse breeders of the Islands.

LETTERS AND CORRESPONDENCE.

Letters from the Deputy Territorial Veterinarians on Hawaii and Maui pertaining to the proposed stations to be built there, as well as to the tuberculosis control work, are herewith appended. Also copy of a letter to the three deputies in regard to the extension of the tuberculosis work to their respective islands.

ATTEMPTED ILLEGAL IMPORTATION OF DOG.

The appended statement, pertaining to an attempt at landing a dog from the S. S. Ventura on the arrival of this ship at Honolulu, Sept. 30, in contravention of the dog quarantine regulation of this Board, was made before the Deputy Attorney General and is self-explanatory. Pending action of the Attorney General's Department in the matter, I have deemed it proper to make no further comment on the subject in this report, particularly as all the facts relating thereto have already been laid before the members of the Board.

As the efforts of the California State Board of Health at checking the spread of the disease, seem to be of little avail (see the enclosed reports of the Director of the Bureau of Hygienic Laboratories of the California State Board of Health), there is a constantly increasing danger of the disease reaching the Territory, unless the preventive measures established by this Board are strictly adhered to and that both the steamship companies and the

owners of dogs are made to understand that the regulations in question must be complied with, to the letter.

Territory of Hawaii.
Board of Commissioners of Agriculture and Forestry.
Division of Animal Industry.
Animal Quarantine Station.
Notice.

From and after this date owners of quarantined dogs, and other visitors, will be admitted to the kennel enclosure only at the hours of 10 to 11 a. m. and 3 to 4 p. m. on week days, and between 2 and 4 p. m. on Sundays and holidays.

Under no circumstances will owners or visitors be admitted to the kennel enclosure unless accompanied by the keeper who will see to it that visitors do not pet or otherwise handle or feed the quarantined animals.

The wishes of owners or agents in regard to diet and care of quarantined dogs will be complied with when consistent with sanitary or hygienic requirements, but in order to prevent the possible transmission of infection to human beings it is necessary that no actual contact between visitors or owners and the dogs be allowed, except by special permission or in the presence of one of the veterinary officials of the Board.

Horses, mules and asses in quarantine must remain in the enclosures assigned to them for the entire quarantine period, unless a change is required for sanitary or hygienic reasons, in which case permission must be obtained from the Territorial Veterinarian or his assistant and the change effected in his presence.

To remove or replace halters, or to divide or separate bunches of horse stock the animals must be taken to the enclosed yard where a cutting chute is provided for the purpose. Under no circumstances are bunches or flocks to be divided or individual animals roped or caught in the woven wire enclosures.

Visitors to or prospective purchasers of quarantined horse stock will not be allowed to enter the enclosures except when accompanied by the owner or his representative, who will be provided with a duplicate key to the enclosure where his animals are kept.

All imported work animals must be removed from the quarantine station before sunset on the day the quarantine period expires. If not removed a charge of 25 cents per head per day will be made, the same to be collected by the keeper in charge before the animals are released.

All live stock imported for breeding purposes shall be entitled to the use of the station without cost and for such period of time

as may be required for observation, rest, treatment or testing before proceeding to their ultimate destination in the Islands.

.....
Territorial Veterinarian.

Approved:

Honolulu, Sept., 1912.

.....
President and Executive Officer Board
of Agriculture and Forestry.

STATEMENT OF DR. NORGAARD IN RE ILLEGAL IMPORTATION OF DOG
BY MAURICE A. BRASCH.

Pursuant to instructions received from the Attorney General's office as well as from the Board of Agriculture and Forestry, I called, accompanied by the Assistant Territorial Veterinarian, Dr. Case, on Mr. Maurice A. Brasch, at his place of business on Fort street, Honolulu, this afternoon, September 30th, informing him that I was authorized to receive from him a statement, if he so desired to make one, regarding the landing of a dog from the steamship Ventura arriving at the port of Honolulu this morning at 8 o'clock from San Francisco, the said dog being landed in contravention of Rule 6 of the Division of Animal Industry of the Board of Agriculture and Forestry of the Territory of Hawaii. Mr. Brasch admitted his willingness to make such statement and related that the dog in question had been purchased in England; had been shipped by him on board the Lusitania, where at least one other dog was shipped, to New York. Between New York and San Francisco the dog had been left in charge of the expressman in the usual manner, the owners wherever convenient taking the dog from the express car for an airing at such places as Chicago, Omaha and Ogden. In San Francisco the dog was placed on board the steamship Ventura, and according to Mr. Brasch's statement no information was given him in regard to the regulations of this Board prohibiting the admission of dogs to this Territory unless subject to quarantine. Mr. Brasch's memory was refreshed in regard to a somewhat similar case which occurred prior to his leaving for the United States during the month of May, which he admitted he remembered, but thought that the restrictions then in force had long since been rescinded. When asked if he had noticed any posters in the ticket office of the Oceanic Steamship Company or on board the Ventura pertaining to the quarantine of dogs in these Islands, Mr. Brasch stated that he had neither heard nor seen anything to that effect, nor that any officer or employee on board the Ventura informed him or called his attention to the fact that his dog would have to go into quarantine upon arrival here. When asked how the dog was taken

ashore, he stated that the dog was placed in the traveling basket in which it had been carried all the way from England and that Mrs. Brasch carried it under her arm past the customs inspectors ashore, where it was handed to an expressman who carried it to the residence of Mr. Brasch at 1520 Keeaumoku street. The receipt for the same is herewith submitted.

VICTOR A. NORGAARD.

The above statement is correct.

L. N. CASE.

Honolulu, Hawaii, September 30, 1912.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, October 3, 1912.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to submit herewith a report on the work for the month of September.

Tuberculosis Control.

The following animals were submitted to the Intradermal test:

| | |
|---------------------|----------------|
| J. H. Cummings..... | 1 cow; passed. |
| M. Riedell | 1 cow; “ |
| Geo. Wond | 2 cows; “ |
| C. F. Peterson..... | 1 cow; “ |
| F. M. Swanzy..... | 1 bull; “ |

These animals had been purchased in different parts of the island for use in the city dairies and were purchased subject to the test which each animal successfully passed. In educating the dairymen up to the point where they will not buy an animal unless it passes the tuberculin test we have advanced a long way in the control of the disease and its eventual eradication. The next step to be gained is to impress upon the dairymen the importance of inquiring into the health records of that herd from which they desire to purchase animals and to select that herd which has been free of the disease at least two or three years. In so doing there is practically no chance of buying an animal which has been exposed to infection. Such an animal even though infected would pass successfully the tuberculin test only to develop the disease later, perhaps in two or three months and infect the entire dairy.

These points are of great importance and it is due to the entire ignorance on the part of dairy owners of the nature and course of the disease with which they are dealing that so much opposition is encountered and so much distrust evidenced in the application and efficiency of the tuberculin test.

Laws and ordinances may be enacted and enforced and a man thus compelled to have his herd tested, but if he has little knowledge of the disease, he will not carry out a thorough cleaning and disinfecting of his premises, without which the tuberculin test is of little avail. The average dairyman sees in the frequent cleaning and disinfecting of his premises only a waste of labor with no apparent results, but let it be said here that his success in maintaining a herd free from tuberculosis is in direct ratio to the frequency and thoroughness of his disinfection.

Bacteriological Examination of the Milk Supply.

In order to obtain some data on the condition of the milk as it reaches the consumer, a series of bacteriological examinations were made of samples taken from dairies scattered throughout the city. The results have been high counts, which indicates that the milk is not being handled with anywhere near the care that is necessary to produce a superior article.

In all fifteen samples were examined, the results of which are as follows:

Procedure.

In each instance a dilution of 1 to 500 was used and with the exception of Samples 1 and 2, in which I made four plates, three plates were made from each sample. The period of incubation varied.

Results.

Sample 1 taken from the Honolulu Dairymen's Association consisted of 14 hr. old milk from Geo. Holt's dairy.

Sample 2 consisted of the above milk after it had passed through the purifying apparatus. In subjecting it to this process it was strained through two layers of cotton and cheese cloth, exposed to a steam temperature of 150° F. and an electric temperature of 164° F. and then cooled at once to a temperature of 40° F.

After incubating for 48 hrs. at room temperature (27° C.) examination gave the following:

| | | |
|---------------|------------|---------------|
| Sample 1..... | 10,540,000 | bact. per cc. |
| “ 2..... | 500 | “ “ “ |

This shows admirably the effectiveness of the Groucher system of purifying milk.

| | | |
|---------------------------|-----------|---------------|
| Sample 3—Geo. Wond | 30,000 | bact. per cc. |
| “ 4—T. F. Farm..... | 2,033,000 | “ “ “ |
| “ 5—K. Yamashita | 1,285,000 | “ “ “ |
| “ 6—T. F. Farm..... | 2,773,000 | “ “ “ |
| “ 7—F. Medeiros | 1,520,000 | “ “ “ |
| “ 8—P. Miyakawa | 850,000 | “ “ “ |
| “ 9—R. Davison | 750,500 | “ “ “ |
| “ 10—W. P. Alexander..... | 324,450 | “ “ “ |

These samples were taken from the milk as it was ready to be delivered to the consumer and, with the one exception of Geo. Wond, must be considered dirty milk. Of the two samples taken from T. F. Farm, No. 4 represents milk from his own herd and No. 6 mixed milk from Chas. Lucas, Joe Gouviera and T. McGuire dairies, which he retails in bottles. The count was made after 120 hrs. incubation at 27° C.

| | | |
|------------------------------|-----------|---------------|
| Sample 11—S. de Nobriga..... | 2,820,000 | bact. per cc. |
| " 12—Frank Valph | 3,020,000 | " " " |
| " 13—M. Kawamura | 1,120,000 | " " " |
| " 14—Richard Kapena | 945,000 | " " " |
| " 15—V. Souza | 3,224,300 | " " " |

The count was made after 96 hrs. incubation at 27° C.

That such counts should be possible shows that something is radically wrong in the handling of the milk; either the product is contaminated when being drawn from the cow or when it is being cooled and put into containers; probably it is a combination of the two.

Extreme care should be used in the production of such an important food as milk. The opportunities for its contamination are many and the overlooking of a single point will result in the production of an inferior article. To obtain a clean product clean methods must be employed. It avails nothing to milk into a sterile pail through a small opening if the flanks and udder of the cow are dirty, the floor a foot deep with manure and the animal switching its tail continually.

Taking for granted that the milk is drawn under ideal conditions, i. e., clean stable; clean animal with tail confined; clean milker with clean, properly constructed pail, the milk will become contaminated and show a high bacterial count if poured over a cooler which is exposed to the dust and dirt which can blow into the milk room from the street or barn yards and then put into improperly cleaned bottles or cans.

These are points to be closely watched by the milk inspector in his daily round of inspection. Milk can and should be produced here with a count of 100,000 bact. per cc. or less and nothing over that amount should be allowed. If the count is higher, it shows conclusively that some point in the routine of production is being overlooked or slighted. This should be rectified and proper methods enforced by the inspector.

Inspection Service.

One trip was taken to Schofield Barracks on September 5th for the purpose of giving the dogs quarantined there a final inspection and to release them, as the 120 days expired on that date. As far as could be observed, they were in fine condition and nothing further has developed since their release. It is to be hoped that

if in the future dogs are to be quarantined on the reservation, suitable and better appearing kennels may be erected.

Live Stock.

List of live stock entering the Territory at the port of Honolulu:

- S. S. Sonoma—San Francisco, Sept. 2—
1 black Spitz dog—Thomas Lasso.
- S. S. Wilhelmina—San Francisco, Sept. 3—
1 white Toy poodle—Miss Thornton.
4 cts. poultry.
- S. S. Honolulan—San Francisco, Sept. 11—
31 mules, 4 horses—N. H. Churchill.
41 mules—G. Schuman.
4 Hereford bulls—Haleakala Ranch.
4 cts. poultry.
- S. S. Makura—Vancouver, Sept. 11—
1 dog—Geo. Freeland (quar. at Honolulu).
- S. S. Sierra—San Francisco, Sept. 16—
13 cts. poultry.
- S. S. Persia—Orient, Sept. 18—
1 ct. Jap games.
- S. S. Mongolia—San Francisco, Sept. 20—
1 lioness; 2 leopards; 2 pumas—Carlos Bernado.
- S. S. Ventura—San Francisco, Sept. 30—
1 dog—Maurice Brasch.

Respectfully submitted,

L. N. CASE,

Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Sept. 30, 1912.

Hon. Board of Commissioners of Agriculture and Forestry,
Honolulu.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of September, as follows:

During the month there arrived 36 vessels of which 24 carried vegetable matter. The usual careful inspection was made with the following results:

| <i>Disposal with principal causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 1168 | 27,593 |
| Fumigated | 11 | 54 |
| Burned | 27 | 27 |
| Returned | 1 | 14 |
| Total inspected | 1207 | 27,688 |

Rice Shipments.

During the month 23,831 bags of rice arrived from Japan, each shipment accompanied with a certificate of fumigation at Kobe and after our careful examination all shipments were passed as free from pests.

Pests Intercepted.

Twenty-seven packages of fruit and vegetables were confiscated from passengers and immigrants during the month. In a shipment of Orchids from Manila we found larvae of *Actheopeus aterrimus*, a few *Elaterids*, *Staphylinids*, a *Capsid* and a few *Crickets*. In soil around a plant from Japan we found an Earwig with a cluster of eggs. Fourteen boxes of lemons were returned to the shipper at San Francisco on account of being badly infested with the Lemon scale, *Aspidiotus hederae*. A basket of apples which a passenger brought from Seattle showed the fruit badly infested with the Oystershell scale, *Lepidosophes ulmi*, and these were destroyed.

Beneficial Insects.

We distributed 12 lots of Japanese beetle fungus to various applicants. We find it very difficult to get people to collect the beetles for inoculation and our time is so limited that we are unable to furnish inoculated beetles unless those desiring them will deliver quantities to the office.

Hilo Inspection.

Brother M. Newell reports the arrival of 9 vessels, 4 of which carried vegetable matter and 1 moulding sand. There were 191 lots and 1847 packages of fruits and vegetables. Eleven packages had to be treated before delivery.

Inter-Island Inspection.

During the month of September 63 steamers were attended to and the following shipments were passed:

75 packages Plants.
573 bags Taro.
3 packages Fruits.
2 packages Cocoanuts.
1 package Lilyroot.

654 packages total inspected and passed.

The following packages were refused shipments:

22 packages Fruit.

7 packages Plants, infested and carrying soil.

29 packages total inspected and refused shipment.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

REPORT OF FOREST NURSERYMAN.

Honolulu, Sept. 30, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members Board of Agriculture and Forestry, Honolulu, Hawaii.

Dear Sir:—I herewith submit a report of the principal work done during the month of September:

Nursery.

Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold | ... | ... | 151 | 151 |
| Gratis | 7000 | 300 | 1372 | 8672 |
| | <hr/> 7000 | <hr/> 300 | <hr/> 1523 | <hr/> 8823 |

Collections on account of plants sold amounted to \$2.85. The dry weather and the short time that now remains before Arbor Day, when trees will be given gratis, there is no doubt accounts for the small quantity sold.

Seed Collecting.

The collecting of seed on *Tantalus* has been continued and we are now getting together quantities of such seed that may be wanted during the coming planting season. From *Tantalus* we have already collected 15 lbs. of *eucalyptus robusta* seed, $3\frac{1}{2}$ lbs. of *eucalyptus citriodora*, and about $1\frac{1}{2}$ lbs. of *koa*. Smaller quantities of other varieties are being collected.

Plantation Companies and Other Corporations.

The plants distributed from stock raised for companies and corporations who are supplying labor and material for propagating the trees, amounted to 3800 pot grown and 12,000 seedlings in seed boxes.

At the Nursery and Makiki station we are at present propagating 12,000 ironwood trees to be delivered in transplant boxes ready to set out in December; also 200,000 assorted eucalyptus seedlings to be delivered in a few weeks. Another order for 300,000 assorted eucalyptus, to be delivered about December or January, will be started soon.

Makiki Station.

Rearranging the quarters and building an extra shed, also getting ready trees for Arbor Day, constituted the principal work for the month.

The writer, at the request of the ladies of the Outdoor Circle of the Kilo-hana Art League, has devoted a good deal of time to the pruning and planting of trees along the streets. A much needed pruning of the pink and white shower trees along both sides of Piikoi street has been done. This work required careful attention as the trees had been neglected and both the sidewalks and the driveway were beginning to be encroached on by the low hanging branches. The trees on other streets require attention in the same manner. The favorable comments which we have heard since we started the pruning of trees along the streets would indicate that most people desire to walk on the sidewalk instead of being compelled to leave the sidewalk and take to the driveway owing to the low hanging branches. The interruptions do not always come from the sidewalk trees but also from trees that are planted on private property and allowed to branch over the sidewalk and on to the street in some cases. A law to enforce judicious pruning on streets and sidewalks would be a step in the right direction. Circular No. 2 of the Division of Forestry comments on this very subject in the following words: "Trees should never be allowed to intrude upon the street or highway. Branches must be cut to avoid scratching the tops of vehicles, or people's hats or umbrellas on the sidewalks," etc.

The work of planting both sides of Wilder Avenue is progressing and will be finished in a few days. A gang of prisoners from the county jail is doing the work. This street extends from Pensacola street to Metcalf street. About 200 poinciana regia trees will be used which are being supplied from the Nursery.

U. S. Experimental Planting, Nuuanu Valley.

The long, dry spell has kept the planting back and we have been

obliged to care for the trees at the Makiki Station until there is moisture enough to warrant the planting of more trees.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

CARE OF THE HORSE.

(Read before the Medical Association of the San Francisco Veterinary College, 1818 Market street, San Francisco, California, by Student Robert Cilker, during 1911-12 session.)

Sand Cracks.

Sand cracks are classified according to their location. They are called toe cracks when occurring in the middle line of the horn of the toe, and a quarter crack when occurring in the horn of the quarters. There are also sand cracks of the sole and of the frog met with, but are not plentiful, and rarely serious enough to cause much trouble.

The toe crack is met with more often in the hind foot than in the fore, while the quarter crack is met with more often in the fore feet, and is here usually confined to the inner side. The portion of the wall known as inside and outside of the toe is seldom affected. A crack is called complete when it extends from the coronary margin of the wall to its wearing edge, and is incomplete when it is not so extensive. A simple crack is one that occurs in the horn only and does not implicate the sensitive structures beneath. A complicated crack is one that is deep enough to allow of laceration and subsequent inflammation of the sensitive membrane; such complications may vary from a simple inflammation set up by laceration, and irritation of the sensitive structures, by particles of dirt and grit that have gained entrance through the crack, to other and more serious changes in the shape of the formation of pus, hemorrhage from the blood vessels, caries of the coffin bone, or there may be a tumor-like growth of the horn on the inner surface of the wall.

Causes of Quarter Crack.

One of the causes of quarter crack is the faulty conformation of the animal, and I will take up this cause first. In the animal, with turned out toes, more than a fair portion of the animal's weight is thrown upon the horn of the inner quarter; here there are three causes exerting their influence together. The horn is brittle, the wall of the inner quarter is thinner than that of the outer, additional weight is placed upon it and fracture is the result. Another

cause for quarter crack is in the condition of the hoof known as contracted heels. With the contraction and its pressure upon the sensitive structures within the region of the quarters and frog has arisen a low type of inflammation and the horn has become dry and brittle in this region. The exciting cause in its fracture is found in a hard day's work upon a hard, dry road, with perhaps a suddenly imposed improper distribution of weight, due may be to stepping upon a loose stone or a succession of such evil transfers of weight due to traveling upon a road that is very rough in its whole extent. Another cause for quarter crack is where the wall is very soft from poulticing or perhaps due to the animal feeding in a pasture that is very moist. When this animal is put to work upon a hard dry street the sudden change from extreme moisture to extreme dryness, combined with hard work will cause the wall to deteriorate and may be the cause of a crack. Unskilful shoeing also plays a part in causing sand crack. Removal of the periople by excessive rasping is a pre-disposed cause. Cracks or their starting points may also be caused by using too wide a shoe. Poor shoeing does not cause cracks though as much as many other things, for more depends on the state of the wall and conformation than upon the existing cause.

Toe Crack.

This crack is met with nearly always in a heavy animal, in the hind feet, and is directly attributable to starting a heavy load.

Cracks of the Sole and Frog.

Sand crack of the sole and frog is but seldom met with and then it is in connection with some exceptionally deteriorated quality of the horn, or occurs as the result of a direct injury and from a badly pumiced foot.

Treatment.

In a simple case where the crack is superficial and close under the coronary margin of the wall a sharp cantharides blister to the coronet immediately above it will be very effective, as in this manner an increased secretion of the horn is brought about and the crack prevented from becoming longer. No matter what treatment you use a blister applied to the coronary margin is always beneficial. To get the best result from a blister it should be repeated several times and at intervals of about two weeks. Another method known as clamping the crack is usually used where the crack is rather long. There are a good many different kinds of clamps and so I will only endeavor to describe one. This clamp called Kester's Sand Crack Clamp, is rather wide with five teeth on each side. A groove is burned on each side of the crack to accommodate the jaws of the instrument and the clamp itself pressed home by means of a special pair of forceps. No clamps

should be put on unless the wall is moderately strong, and the wall should be thick. All clamps are put on for the same purpose, to try and stop any movement of the wall in the region of the crack.

Other means employed are by paring out on both sides of the crack, starting about a half an inch on both sides of the crack and cutting it out to the bottom at an angle. Apply an antiseptic dressing and over this cotton, then wrap the whole foot with tape as tight as possible. The tape is used for two reasons, to dry and keep out as much dirt as possible and stop the movement of the wall in the region of the crack.

The following prescription is one of the most beneficial used in the treatment of cracked or brittle feet:

R

Yellow Wax

Olive Oil

Lard

Venice Turpentine

Honey, of each 8 ounces.

Melt lard, wax and honey (slow fire), then add the rest, and stir until cold. Apply once daily.

Surgery.

This method is only indicated when the crack is greatly complicated by the presence of pus, or by the growth of adventitious horn on the inner surface of the wall. When the crack does not extend the whole length of the wall, the best method is to cut out a triangular piece with the base uppermost, cutting as deep as the sensitive lamina. With the removal of the horn the diseased structures are exposed to view. All such should be removed by a free use of the scalpel and a suitable dressing afterward applied. If the crack runs the whole length of the hoof take out a piece on either side of the crack, the whole length of same. After treatment is exactly the same as the one just referred to.

Shoeing.

A partial rest is given to the affected parts by easing the bearing of the shoe at the point required. This may be done either by removal of part of the wall at the spot indicated, or by thinning the web of the shoe in the same position. Never have a clip directly under the crack or where the weight would fall. If it is a toe crack the usual clip should be dispensed with and a clip on each side made to take its place. At the same time care should be taken to avoid throwing the weight forward. In case of a quarter crack, where the constant movement of the part under the expansion and contraction of the foot makes itself most felt, it is wise to apply a shoe with clips fitting moderately tight against the inside of the bars. By this means movement will to a large extent be stopped.

MISLEADING EVIDENCE.

We have recently received several samples of fertilizers with requests that we would express an opinion as to the manure, because their colors created suspicion; indeed, there are hacendados who judge manures almost entirely by appearance and smell, and are thus liable to make serious mistakes.

Appearance, smell, or color are no guides; the only true test in buying fertilizers is chemical analysis, although the best test is made by the crop itself.

Nitrate of soda in appearance does not differ much from coarse impure salt, and can be relied upon, when imported from the mines in Chile, to contain approximately 16% of nitrogen.

Sulphate of ammonia is a substance which is very variable in appearance, it may be gray or white, or yellow, or blue, without any real difference in the quality; it contains more nitrogen than nitrate of soda, but being less soluble than the latter, it is consequently less valuable.

Superphosphate may be light gray, or a dark gray or brown; its tint simply depends on the color of the raw material from which it is manufactured. The hacendado need not trouble about the tint so long as the percentage of phosphate of lime is up to the guaranteed standard.—Exchange.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.,

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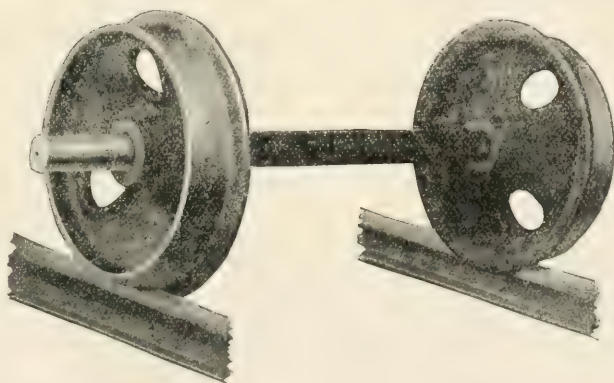
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BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900: 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1901: 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904: 176 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905: 240 pp.; 8 plates; 36 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906: 212 pp.; 8 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907: 200 pp.; 5 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908: 218 pp.; 24 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910: 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper: 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1: 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
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DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1. Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

NOVEMBER, 1912.

No. 11.

Our plant pathologists may be interested in an article in this number, containing a synopsis of an address by Professor Salmon to the British Mycological Society last year on problems of economic importance regarding plant diseases.

A bulletin on citrus scab has been received from the University of Florida experiment station. It is by H. S. Fawcett, and in a table of references quotes J. E. Higgins in a bulletin of the Hawaii experiment station issued in 1905. The Florida bulletin gives three modes of prevention—1, destroying all sour orange or other worthless growth; 2, spraying when necessary; 3, cutting out scabby growths.

Intelligence of vast importance to the future of the American raw cotton industry is contained in an article in this number on cotton-growing in Argentina. That country is there said to have as large an area adapted to cotton-growing as the United States. Although the Argentina industry is now handicapped for lack of labor, an enormous Spanish immigration, together with the exploitation of a Barcelona syndicate, may tell a different story in the not distant future.

There will surely be no question about the extension of bovine tuberculosis control work to the islands other than Oahu, either through action by the incoming boards of supervisors for the different counties, or, if this should be impracticable for lack of revenue, by the legislature in measures to provide either the county boards or the board of agriculture with the requisite funds for the campaign. It will not do to compel the municipality of Honolulu to rest under the menace of infection from outside after having its herds made clean through the combined measures of the board of supervisors and the board of agriculture.

That strange disease reported as existing among horses in Waipio Valley, mentioned by Dr. Norgaard in his monthly report in this number, has proved to be a recrudescence of the glanders epidemic of several years ago. This the Territorial veterinarian ascertained on personal investigation on the ground, and on his return President Giffard despatched him back with instructions to

carry out his recommendation of a quarantine of the district along with a roundup of all the stock. This action was approved and ratified by the board at its monthly meeting.

BRAZIL'S ENORMOUS RUBBER RESOURCES.

An article on the wild rubber trees of Brazil in the Bulletin of the Bureau of Agricultural Intelligence and Plant Diseases contains facts that might well strike dismay into the developers of rubber in other countries, were it not for the saving clause, so to speak, of the inaccessibility of the vast resources of the wild article for marketing—a condition that is not likely to be overcome in the near future, or until the rapidly growing demand for rubber will call for the prodigious reserves of the Brazilian forests. The article says in part:

"The world's consumption of rubber is calculated by M. A. Dubosc as being, for 1911, 85,000 tons, with a co-efficient of increase of 8% per annum, which would raise the total world's consumption to 180,000 tons about 1920, and the business turnover calculated by Sir H. Blake at 1,100 million per year, would attain to more than 2½ thousand million francs.

"Of the whole of this enormous consumption, the greatest part is supplied by Brazil with its wild rubber, Para, which also ranks highest in point of quality. In 1910 Brazil is said to have produced 38,000 tons of Para, that is, one-half of the world's consumption.

"Each great producing region appears to have its special rubber plant. In Brazil the area of Amazonas, which is the principal producing centre, amounts to nearly 6½ million sq. kilometers (2,509,000 sq. miles) i. e., 12 times the area of France. In all parts of this state there are found one or another of the varieties of *Hevea* or *Castilloa* but especially that wonderful tree, *Hevea Brasiliensis*, which, with well-conducted tappings can when mature, at about 35 years, yield up to 12 kgs. (25.4 lbs.) of rubber. The number of trees standing in the two States of Para and Amazonas is estimated at 200 million. In the State of Amazonas, the field of working of the natural 'seringaes' (rubber estates) is growing day by day, in consequence of exploration being carried to the very remotest ramifications of the great rivers, which are the confluent of the Amazon; unfortunately the impossibility, almost, of transport make the cost price unremunerative. Still the reserves of rubber ripe for tapping in the Amazonian region are not limited to the great number of *Hevea Brasiliensis* forming the principal wealth of that country. They are also formed by other natural rubber bearing species of appreciable value, at least equal to that of some famous plants of other countries."

EVOLUTION OF RUBBER.

An article on rubber expositions as a trade stimulus, by Sir Henry A. Blake in the *India Rubber World*, contains the following passages, the remarks about rubber for roadmaking being of universal interest:

"During the exhibition it became known that an international exhibition on somewhat similar lines was projected for New York, and now that the project has materialized, further progress will doubtless be made in the solution of many problems with which rubber planters and manufacturers have still to deal. Great as is the production in sight, the horizon of demand is ever widening. One hundred and forty years ago, its only known practical use was as an eraser of pencil marks. Today it ministers to the wants of the infant in his cradle, as well as to the comfort of the aged, while in one form or another it enters with frequency into the countless demands of civilization.

"Among the exhibits at the Agricultural Hall, there was one that promised important developments. This was a section of rubber prepared for roadwork but not yet fulfilling all the necessary conditions that would enable it to compete with the quarry and the forest for the preparation of road surfaces for heavy traffic. That this difficulty will be overcome, there can be no doubt, and when it has been, any possible doubt of a limitless demand will vanish like a moving mist. Silent streets with the cessation of the turmoil and roar of traffic, would in relief of brain fog to the busy worker, be the most potent factor for health and strength ever offered to the business men and women of great cities, while imperviousness to water would obliterate dust and mud, carry off equally heavy rains or melting snows and save the endless labor on frost upheavals every spring that try the equanimity of dwellers in New York.

"There is a giant in the path whose name is 'skid,' but Jack the Giant Killer will emerge from some busy inventive brain and demolish the skid by a non-slip grip surface that will withstand wear and tear and secure safety in all weathers in horse or motor. From which side of the Atlantic will he emerge? There's the rub!"

The *Cuba Review* for September, 1912, gives a table which shows that the chief exports of fruit and fruit products from Porto Rico to the United States during 1912 were valued as follows: Grape fruit, \$524,976; oranges, \$584,368; pineapples, \$683,801; lemons, \$3,131; limes, \$960; canned pineapples, \$258,671. Shipments of honey to the value of \$42,251 were also sent.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Oct. 29, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Members of the Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I beg to report on the work of the Division of Animal Industry for the month of October, 1912, as follows:

Animal Quarantine.

Pursuant to instructions received by the President of this Board after the last monthly meeting, in regard to the admission of performing animals subject to quarantine under the rules and regulations of the Board, a circular letter, dated October 22, 1912, was sent to all theatres and amusement agencies in Honolulu informing them as per the appended copy, that henceforth all such animals would have to undergo the regular quarantine, the same as other animals for whatever purpose imported.

A few days before this letter was sent out there arrived in Honolulu three performing Shetland ponies which, at a special meeting of the Committee on Animal Industry, were allowed to be quarantined in a shed provided for the purpose at the rear of the Liberty Theatre. The quarantine on these animals will expire on October 29, 1912, and there will consequently be no cause for action of the Board on an application for permission to exhibit the ponies at Kahului and Hilo, and the agents have been so informed.

With the receipt of General Macomb's acknowledgment of the letter informing him that no further special permit to quarantine dogs belonging to the military authorities outside of the Territorial Animal Quarantine Station would be granted, this subject may be considered as definitely disposed of.

Honolulu Quarantine Station.

For the display of the rules governing the actions of visitors and owners of quarantined animals, as approved by the Board, a glass fronted case has been ordered and will be placed at the main entrance to the station. Below this case a push button, connecting with an electric bell, will be placed, so that the keeper may be summoned to admit visitors and others calling on business outside the regular visiting hours. During these hours, 10:00 to 12:00 a. m. and 2:00 to 4:00 p. m., the main entrance will be kept open and the keeper be in attendance, while at all other times the station will remain closed except for the admission or discharge of animals, so that the keeper may give his full time to the care and keep of the station and the animals.

Hilo Quarantine Station.

The surveyed plan of the site of the Hilo Quarantine Station was received from Messrs. T. H. Davies & Company during the past month, and in accordance with instructions received, a rearrangement of the enclosures, chutes and feed-rooms, as planned in the original blue print, has been effected. A copy of the same has been sent to the Deputy Territorial Veterinarian at Hilo for his approval or for such alterations as he may wish to suggest after examining the general topography and surface of the new site. When returned to this Board the final plans and specifications will be prepared and tenders advertised for.

Kahului Quarantine Station.

During the past month the chairman of the Committee on Animal Industry visited Kahului, Maui, and selected a piece of land which Messrs. Alexander & Baldwin had been good enough to offer to transfer to this Board for a nominal consideration, for the purpose of the establishment of an animal quarantine station for the island of Maui. Messrs. Alexander & Baldwin have promised to have this piece of land surveyed, and when a plan of same is received a sketch of pens, chutes and enclosures will be made so as to come within the allotted appropriation of \$1,000.00 set aside by the Board for this purpose.

Attempted Illegal Importation of Dog.

In regard to this subject, it appears that owing to the indisposition of the County Attorney, it has been impossible for the Attorney General to take any further steps in regard to the prosecution of Mr. Brasch for attempting to import a dog in circumvention of the regulations of this Board. The steamship "Ventura" will return to this port from Australia on November 1, 1912, when it is the Attorney General's intention to prosecute the master of that vessel in connection with the same case.

Tuberculosis Control Work.

According to instructions received from the President of this Board; a letter was addressed to the deputy Territorial veterinarians at Hilo, Kahului and Lihue, requesting them to take the necessary steps to ascertain in how far it would be advisable or feasible to extend the tuberculosis control work to the Islands outside of Oahu, at the present time. The respective answers to these letters are herewith appended, and while there seems to be a certain desire to have all dairy animals tested for tuberculosis, it appears to be a question whether so important a subject should be presented for action by the respective Boards of Supervisors at

such a late time in their incumbency of office. To assume the responsibility for the promulgation of an ordinance requiring the testing of all dairy cattle and the destruction of all animals found to be affected with tuberculosis, by these various boards just before a majority of their members may be retiring from office can hardly be expected of them, and as some time will be required for the further education of both dairy owners and milk consumers to thoroughly understand the importance of this measure, it may be better not to force an issue at the present time, but rather to get prepared to present a uniform milk ordinance for the approval of the respective new Boards of Supervisors as soon as possible after they have become established in office.

About twenty head of cattle have been tested during the month, most of them dairy animals being bought or sold or transferred from stable to stable, out of which number three animals have reacted; at the same time the assistant Territorial veterinarian has given considerable time to the testing and examination of milk samples as collected by the municipal milk inspector. Dr. Case's report shows that while there is an improvement over the conditions reported on last month, there is still room for a considerable reduction in the number of micro-organisms found in most of the samples.

Epidemic Among Horses on Hawaii.

On the 28th inst. a message was received from Messrs. Schaefer & Company informing the Board that an outbreak of an unknown disease had occurred among the horses in Waipio Valley on Hawaii and that six (6) head had died, requesting that the Territorial Veterinarian be asked to investigate. Four years ago an epidemic of glanders occurred in Waipio Valley, resulting in the loss of more than twenty (20) horses, but judging from the information available it did not seem likely that the present disease could be glanders, and the Territorial Veterinarian has consequently been instructed to make an investigation immediately. In order to prevent the further spread of the disease a wireless message addressed to the manager of the Kukuihaele Plantation Company was forwarded immediately instructing him to place Waipio Valley in quarantine, that is, not to allow any sick or suspicious animals to leave the valley, but to hold the same for examination by the Territorial Veterinarian upon his arrival there. As soon as the true nature of the disease has been ascertained I shall report to the Board, and expect to return from Hawaii within a week or ten days.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Oct. 31, 1912.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to submit herewith a report for the month of
October:

Tuberculosis Control.

The following animals were subjected to the intra-dermal test:

| | | T. | P. | C. |
|---------|--------------------------------|-------|-------|-------|
| October | 7-10—Mrs. Andrews | 1 | 1 | 0 |
| " | 9-12—Bernal Live Stock Co..... | 12 | 10 | 2 |
| " | 10-12—A. Waterhouse | 5 | 5 | 0 |
| " | 16-19—F. C. Atherton..... | 1 | 0 | 1 |
| | | <hr/> | <hr/> | <hr/> |
| | | 19 | 16 | 3 |

Although the number examined is small it contains points of considerable interest. The animals tested for the Bernal Live Stock Company came from Kona and were purchased from the Gouveira Ranch, which supplies different dairies on this island with a good many milch cows. Out of two hundred (200) head of cattle arriving here from Kona ten (10) have been condemned on the test which, if this can be taken as any criterion, would show 5% of tuberculosis among the dairy animals in Kona, Hawaii. This further means that with every hundred head of cattle shipped in here from Kona there are five tuberculous animals to become centers of infection.

This clearly demonstrates the value of eternal vigilance in the campaign against tuberculosis and the great value of a milk ordinance, such as we have, which requires that every dairy supplying milk for human consumption must be composed of animals free from tuberculosis, in other words animals which have successfully passed the tuberculin test.

By keeping careful watch over the dairies we have been able to eliminate ten centers of infection which have been imported directly from the island of Hawaii. Had these ten animals gone untested they would have rapidly spread the disease either directly or indirectly to every dairy on the island of Oahu, and the labor of years would have been lost and conditions would have rapidly reverted to what they were when systematic testing was first established.

Dairy stock shipped from the other islands are purchased by dairymen here subject to the test so the condemnation of these animals entails no loss to them as other animals are sent to take their places. It has been the natural tendency on the part of the

dairymen to send the condemned animals back, but to allow this would only be to continue the disease and help its spread. Refusing permission to return them and compelling the dairymen under the ordinance to remove them from their dairies has forced these tuberculous animals to the slaughter-house and they have been removed once and for all from endangering human life and from spreading the disease to other dairies.

This forcibly brings to our attention the absolute necessity of continuing the test to the other islands. It is evident that this must be our plan of campaign if we hope to keep the milk supply of the City and County of Honolulu uncontaminated and eventually eradicate tuberculosis from these islands.

On October 16th to 19th I tested and condemned a cow for Mr. F. C. Atherton. The history of this cow, as far as our records show, is interesting and points out the danger of having in the herd or on the premises any untested animal and also the necessity of inquiring into the condition of the animals in a pasture before allowing other animals to go into it.

The cow in question was first owned by Mr. T. H. Cummins and while in his possession successfully passed the tuberculin test on May 25, 1910, and also on February 21, 1911, and was sold to Mr. Atherton on January 23, 1912. At the time of purchase Mr. Atherton had on his premises an untested cow which had been in his possession for about five years and which had recently returned from Chas. Bellina's pasture at Niu, where it had been for some time.

On the first general test quite a number of condemned animals from Mr. Isenberg's herd were sold to Mr. Bellina for a nominal sum and placed by him in this pasture at Niu for the purpose of fattening before sending them to slaughter. These animals either directly or indirectly passed the infection to Mr. Atherton's cow, which then returned to his dairy and was placed with the newly purchased animal.

On March 1st I was called upon to test these two animals. The one which had recently returned from Niu gave a large typical reaction and was condemned and branded. Post-mortem revealed a case of well advanced generalized tuberculosis and the entire carcass was condemned at the slaughter house. The newly purchased cow successfully passed the test.

What significance can be attached to the fact that this animal, which had been in immediate contact with the diseased one for a period of over a month, passed the test. To one who is acquainted with the course of the disease in the animal system, and the paths through which the organism is eliminated and subsequent infection occurs this does not mean that the animal is not infected, for the chances are a hundred to one of its being so, but that the disease is in the period of incubation, that is, multiplication of the organisms had not reached a stage sufficient for the

production of lesions in the animal tissue. That the cow would react at a later date was almost a certainty.

Such being the circumstances Mr. Atherton was advised to have the cow retested at a later date, consequently on October 16th I was called upon to again test this animal. Upon this test she gave a large typical reaction and was condemned and branded. After careful post-mortem at the slaughter-house Dr. Monsarrat reported that he was unable to find any lesions of tuberculosis. This cannot be considered as meaning that there was an entire absence of disease, but rather that the lesions were so small and so few as to readily escape detection. It is very easy to overlook a few small nodules in the substance of the large lung of a cow or one or two small nodules in one of the numerous lymphatic glands of the body, and one rapidly progressing lesion is enough to cause a reaction to the test and reveal the presence of disease.

I think we can safely say from the results of the post-mortem examination that this cow was not a danger to public health at this stage of the disease, but who can say when she would become dangerous, who can say when she would begin to pass tubercle bacteria in her milk and feces. I think that in a few months more she would have become a real live danger to her owner and to any animal with which she might become associated.

This brings us to the question: what relation does the size of the swelling in a reaction bear to the disease in the animal system as demonstrated by post-mortem examination? It has been demonstrated repeatedly by post-mortem examination that the size of the reaction bears no direct relation to the amount of the disease. That it has some important relations to the disease is apparent. After much thought upon the subject and many post-mortems I have reached the conclusion that while the size of the swelling has no direct relation to the *amount* of disease it has a *very close* relation to the progress and activity of the tubercle bacteria within the animal system. This will vary as will the size of the reaction vary as the resistance to the disease varies.

Bacteriological Examination of the Milk Supply.

During the last month twenty-five (25) samples of milk and cream from different dairies were analyzed for their bacterial content with the following results:

No. 1—Mixed milk from Andrade, Moanalua, Bellina and Salina dairies. Exam. after 72 hours inc. at 27° C. 229,160 bact. per cc.

No. 2—Same as above taken from purifying machine. Exam. after 72 hours inc. at 27° C. 1,500 bact. per cc.

No. 3—George Holt dairy. Exam. after 72 hours inc. at 27° C. 823,330 bact. per cc.

No. 4—Same as above after passing through the purifier. Exam. after 72 hours inc. at 27° C. 1330 bact. per cc.

No. 5—Cream after pasteurization at 150° F. for 10 m. Exam. after 72 hours inc. at 27° C. 273,330 bact. per cc.

No. 6—Waialae Ranch milk. Exam. at 72 hours inc. at 27° C. 396,000 bact. per cc.

No. 7—Jersey milk from Mrs. Isenberg's herd. Exam. after 72 hours inc. at 27° C. 65,000 bact. per cc.

No. 8—H. B. Brown dairy. Exam. after 72 hours inc. at 27° C. 119,160 bact. per cc.

No. 9—Cream after pasteurization at 150° F. for 10 m. Exam. after 72 hours inc. at 27° C. 100,000 bact. per cc.

No. 10—K. Inouye dairy. Exam. after 96 hours inc. at 27° C. 39,000 bact. per cc.

No. 11—S. Tsumoto dairy. Exam. after 96 hours inc. at 27° C. 876,660 bact. per cc.

No. 12—S. Hirata dairy. Exam. after 72 hours inc. at 27° C. 120,000 bact. per cc.

No. 13—F. Gouveira dairy. Exam. after 72 hours inc. at 27° C. 100,500 bact. per cc.

No. 14—T. F. Farm dairy. Exam. after 72 hours inc. at 27° C. 126,660 bact. per cc.

No. 15—J. M. Whitney dairy. Exam. after 72 hours inc. at 27° C. 50,000 bact. per cc.

No. 16—T. H. Cummins dairy. Exam. after 72 hours inc. at 27° C. 75,500 bact. per cc.

No. 17—W. E. Wall dairy. Exam. after 72 hours inc. at 27° C. 30,500 bact. per cc.

No. 18—Waialae Jersey milk (house) 5 hours old. Exam. after 72 hours inc. at 27° C. 30,330 bact. per cc.

No. 19—Waialae Jersey milk (barn) 5 hours old. Exam. after 72 hours inc. at 27° C. 70,000 bact. per cc.

No. 20—Waialae Ranch milk 5 hours old. Exam. after 72 hours inc. at 27° C. 383,750 bact. per cc.

No. 21—Cream after pasteurization at 150° F. for 10 m.; 24 hours old at 40° F. Exam. after 72 hours inc. at 27° C. 210,000 bact. per cc.

No. 22—George Holt dairy; 6 hours old; temp. 82° F. Exam. after 72 hours inc. at 27° C. 650,000 bact. per cc.

No. 23—T. F. Farm dairy, fresh from cooler. Exam. after 72 hours inc. at 27° C. 217,330 bact. per cc.

No. 24—T. F. Farm dairy, fresh cream. Exam. after 72 hours at 27° C. 3,190,000 bact. per cc.

No. 25—I. Nayaki dairy; 8 hours old on ice. Exam. after 72 hours inc. at 27° C. 1,322,000 bact. per cc.

There has been some improvement in the manner of handling the milk in the dairies during the last month, but there is still room for further improvement. Looking at samples Nos. 6 and 7, 18, 19 and 20 it is very evident that greater care is used in the handling of milk from Mrs. Isenberg's Jersey herd than is used in the production of milk from the ranch herd. So marked a dif-

ference should not be; as much care should be exercised in the production of milk from one dairy as the other. There seems to be a disposition on the part of the Dairymen's Association to accept milk no matter what its condition and from those who have not even a permit to sell milk. This is no doubt due to the confidence they have in their purifying apparatus and its demonstrated ability to considerably lower the bacterial content of milk subjected to its influence, but there is a higher principle involved. The position occupied by the Dairymen's Association in the system of milk supply of the city is such as enables it to exert a powerful influence toward the betterment of the product as it reaches them, and it should use this influence to encourage its many contributors to produce a clean produce in a sanitary way.

Samples Nos. 23, 24, 25 show counts far above what they should be and from one dairy in particular which has shown no improvement over last month. Advice and instructions have been given and the Municipal Milk Inspector is keeping close and careful watch of this dairy along with several others and material improvement may soon be expected.

Inspection Service.

The following is the list of inspected live stock admitted to the Territory through the port of Honolulu:

- Oct. 1—S. S. Wilhelmina, San Francisco:
 - 1 dog, Mrs. E. D. Tenney, quarantined.
 - 5 cts. poultry.
- Oct. 1—S. S. Workman, Liverpool, England—
 - 3 bull dogs, Mr. J. W. Waldron. As they were accompanied by the proper certificates, and as England is one of the three countries regarded by us as free from rabies, they were allowed to enter the Territory without being subjected to a period of quarantine.
- Oct. 9—S. S. Honolulan, San Francisco—
 - 15 Hereford bulls, 1 Berkshire boar, Raymond Ranch.
 - 2 Jersey bulls, 1 Jersey heifer, 3 German sheep dogs (quarantined), D. P. R. Isenberg.
 - 1 Berkshire boar, W. F. X. Co.
 - 5 crates poultry.
- Oct. 10—S. S. Zealandia, Vancouver, B. C.—
 - 1 dog (Pointer), Mr. J. B. Mercer, quarantined.
- Oct. 14—S. S. Sierra, San Francisco, Cal—
 - 3 ponies, 1 monkey, Leon Morris. The three ponies were show animals, and to facilitate their handling the Board allowed them to be quarantined at the Liberty Theatre.
- Oct. 15—S. S. Hilonian, Seattle, Wash.—
 - 2 horses, Honolulu Const. and Draying Co.
- Oct. 15—S. S. China, Orient—
 - 1 crate Japanese game chickens, Diamond K.

- Oct. 16—S. S. Virginian, Tacoma, Wash.—
73 horses, Charles Bellina.
Oct. 28—S. S. Sonoma, San Francisco, Cal.—
3 crates chickens, W. F. X. Co.
Oct. 29—S. S. Chiyo Maru, Orient—
3 crates chickens, Diamond F.
Oct. 30—S. S. Wilhelmina, San Francisco, Cal.—
7 crates poultry.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, October 31, 1912.

Hon. Board of Agriculture and Forestry, Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of October, as follows:

During the month there arrived 35 vessels, of which 18 carried vegetable matter and 1 vessel carried clean moulding sand. The usual careful inspection was made with the following results:

| <i>Disposal, with principal causes.</i> | <i>Lots</i> | <i>Parcels</i> |
|---|-------------|----------------|
| Passed as free from pests..... | 1184 | 28,470 |
| Fumigated | 46 | 149 |
| Burned | 16 | 861 |
| Total inspected | 1246 | 29,480 |

Rice Shipments.

During the month 21,544 bags of rice arrived from Japan, most of which consisted of new crop rice. All shipments were carefully inspected and released as free from pests.

Pests Intercepted.

During the month 48 packages of fruit and vegetables, including 2 packages of sugar cane, were taken from the baggage of the passengers and destroyed. The sugar cane consisted of ten pieces, 3 feet long. This was taken to the Lucas Mill and burned.

In the mail during the month we handled 92 packages of plants and seed. We found several packages of corn and peas infested with the *Augoumois grain moth* and the *pea weevil* and notified the shippers of these infested shipments.

Several passengers from Japan brought chestnuts which we found badly infested with weevils and larvae of a moth and these were first fumigated with carbon bisulphide and then destroyed by burning. While inspecting on the dock we found a single specimen of the Harlequin cabbage bug, *Murgantia histrionica*, crawling on merchandise cargo. I only mention this to show that it is very easy for insects to be transported from one country to another. This bug probably found its way from some cabbages on an adjacent dock in San Francisco and was brought in here unmolested in the ship's hold. Also, while walking on deck of the steamer "China" from the Orient, a common Dermested beetle, *Dermestes vulpinus*, flew onto my coat, from out of the hold of the vessel. This insect infests hides and is found around bone fertilizers, etc., and is cosmopolitan.

One hundred gardenia plants which arrived by freight on the steamer "Chiyo Maru," were badly infested by a *Lepidopterous* borer, probably a *Tortrix* species. The larvae had girdled the young plants at the surface of the ground and also had made channels through the bark of the plants. Our preliminary fumigation with *Hydrocyanic* acid gas failed to kill them. We then fumigated them with *Carbon bisulphide* and burned up the entire shipment.

Hilo Inspection.

Brother M. Newell reports the arrival of 10 vessels—five steamers and five sailing vessels. The five steamers brought vegetable matter consisting of 154 lots and 2369 parcels. One package of plants was fumigated and fifty sacks of potatoes were overhauled before being released.

Inter-Island Inspection.

During the month of October 60 steamers were attended to and the following shipments were passed:

| | |
|---------------------|-------------|
| Plants | 60 packages |
| Fruits | 14 " |
| Lily Root | 4 " |
| Taro | 716 bags |

Total 794 packages
inspected and passed.

The following packages were refused shipment:

| | |
|--|-------------|
| Various fruits | 40 packages |
| Plants infested and having too much soil | 22 " |
| Vegetables | 4 " |

Total inspected and refused shipment.. 66 packages

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

REPORT OF FOREST NURSERYMAN.

Honolulu, Oct. 31, 1912.

Hon. W. M. Giffard, President and Executive Officer, Board of
Agriculture and Forestry.

Dear Sir:—I herewith submit a report of the principal work
done during the month of October, 1912.

Nursery—Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold | 500 | 50 | 406 | 956 |
| Gratis | ... | .. | 467 | 467 |
| | <hr/> 500 | <hr/> 50 | <hr/> 873 | <hr/> 1423 |

Collections on Account of Plants Sold.

The collections for the month on account of plants sold amounted to \$10.05.

Arrangements are being made for the distribution of a large number of forest and flowering trees consisting of sixteen species for Arbor Day planting, November 8. Superintendent Pope of the Department of Public Instruction has sent copies of a circular letter to the principals of all the public schools of the Territory notifying them that trees for Arbor Day planting can be had free by applying at the Government Nursery in Honolulu and also at the two sub-nurseries on the other islands.

Advertisements notifying the general public of the offer of this Board to supply free trees for planting on that day are being published in all the leading newspapers in Honolulu and on the other islands, in the English, Hawaiian, Portuguese, Japanese and Chinese languages.

Plantation Companies and Other Corporations.

Under this head orders have been received for 5000 trees in transplant boxes ready to set out. Orders so far received to be delivered during the months from November, 1912, to February, 1913, reaches the total of 500,000 assorted trees in seed boxes and 17,000 in transplant boxes ready to set out. One hundred and forty thousand trees in seed boxes have been delivered during the month and 12,000 trees in transplant boxes and 60,000 in seed boxes will be delivered in November. The orders will all be filled in time for the season's planting.

Experiment Garden, Makiki.

The men at this station have been assisting in getting trees ready for Arbor Day and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The man employed for the purpose of attending to the trees has been hoeing and clearing away the grass from the young trees.

Now that the weather is getting more favorable for tree planting, we intend, after the Arbor Day rush is over, to plant more species and also to fill a few blanks in the planted part of this section.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

REPORT ON ARBOR DAY.

Honolulu, Nov. 11, 1912.

Hon. W. M. Giffard, President and Executive Officer, and Board of Agriculture and Forestry, Honolulu.

Gentlemen:—Herewith I submit a special report on Arbor Day for the year 1912.

Distribution of Trees.

The total number of trees distributed for Arbor Day planting amounted to 13,645 (13,145 pot grown and 500 in transplant boxes), divided as follows:

Public Schools.

| Island | Number of schools | Number of trees |
|-------------------|----------------------|--------------------|
| Oahu | 13 | 383 |
| Hawaii | 7 | 236 |
| Maui | 14 | 479 |
| Kauai | 6 | 471 |
| Molokai | 4 | 339 |
| Total | 44 | 1908 |

General Public.

Applications for trees were received from 248 persons residing in and around Honolulu. To this number might be added 400

children from the public schools who called on Arbor Day and received one tree each.

The number of trees distributed amounted to 9,514. From the outside districts of the other islands, including Oahu, orders were received for 2,223 trees.

Summary.

| | Trees |
|--|--------|
| Public Schools | 1,908 |
| In and around Honolulu..... | 9,514 |
| Outside districts of other islands including Oahu..... | 2,223 |
| Total | 13,645 |

The total number of trees distributed for Arbor Day, 1911, amounted to 11,508, making an increase of over 2,000 trees for 1912.

The demand for flowering and shade trees has been much larger this year than for any preceding Arbor Day and our stock of these is almost exhausted. We have, however, a large number of forest and windbreak trees still in stock.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

ARTIFICIAL CROSS-FERTILIZATION OF THE MANGO.

By A. J. BROOKS,

Assistant Agricultural Superintendent, St. Lucia.

(From the West Indian Bulletin.)

This work, as carried on at Dominica, is at present in its initial stages, but some benefit might be derived by placing on record the work that has so far been accomplished in the attempt to raise improved varieties of mangoes from seed.

There are numerous seedling mango trees to be found in most of the West Indian islands, the fruit of many being quite valueless from a commercial point of view, whilst others possess certain meritorious qualities which allow them to be described as second or third class fruits. Of first class fruits grown directly from seed few only are known to exist, and these have usually originated from plantations which have been confined in a great measure to one variety.

This variation, or failing to breed true, in seedling mangoes is due to indiscriminate cross-fertilization such as obtains in locali-

ties where numbers of different varieties are grown in close proximity, and where no attempt is made to protect the flowers from promiscuous cross-fertilization.

It is now generally acknowledged that by securing fertilization of a plant of one variety with pollen from a plant of a different variety, through cross-pollination, we obtain a variable race of which the individual plants may be expected to possess the inseparable characters of both parents in a varying degree.

The aim of this cross-fertilization was to combine the good qualities of two distinct varieties into a single variety, by securing a number of cross-fecundations between the two, and rearing plants from the seeds thus formed.

The first step in this direction was to make oneself intimately acquainted with the structure and functions of the flower. The flower of the mango, which is pale-yellow with a pinkish tinge, is very small, being only about 3 mm. in diameter. The flowers are borne on much-branched panicles and are very brittle; therefore great care and skill are necessary in their successful manipulation. There are five stamens, not all of which are fully developed and produce pollen.

In the variety chosen as the pollen parent in this instance, two of the five stamens produced pollen but only the pollen from the largest stamen proved to be fertile.

Ceylon No. 1—the variety chosen as the pollen parent—is of good appearance, a prolific bearer, and possesses excellent keeping qualities which should make it a valuable variety for shipping purposes, but it is of poor flavor. The variety chosen as the seed parent was the Julie. This variety is a free and regular bearer and possesses an excellent flavor—by some considered to be unsurpassed—but the fruit is too delicate to stand shipment.

In this particular case the main object sought was to endeavor to procure a variety bearing the keeping qualities of the pollen parent, combined with the excellent flavor of the seed parent.

Panicles bearing flowers of the pollen parent were enclosed in muslin bags. Before the flowers had time to open, to prevent foreign pollen becoming mixed with it, panicles of the seed parent were carefully selected in the most sheltered portions of the trees, and the number of flower buds on them reduced to about twenty. As soon as these were large enough to handle—this was usually found to be about one day previous to their opening naturally—they were opened and emasculated. In most cases the corolla was also cut away with a sharp pair of curved manicure scissors; this was found to give easier access to the stigma. Great skill and care were necessary in this operation, as the pedicels are extremely brittle and many flowers were lost in this way, some falling at once and others withering, no doubt because of injuries received during emasculation.

After emasculation, the panicles were at once enclosed in soft paper bags—1 lb. sugar bags being used for the purpose—the

mouths of which were previously dipped in water to allow them to be drawn tightly round the base of the panicles and tied tightly with raffia to prevent the ingress of insects.

The stigma became receptive very shortly after the natural opening of the flower. This receptive condition of the stigma was indicated by its turning slightly darker than the style and appearing roughened on its surface; this can only be seen with the assistance of a strong lens.

A few ripe anthers were then chosen from Ceylon No. 1 and gently crushed on a watch glass. The pollen was then transferred to the stigma by a small scalpel made by hammering out the small end of a pin. This method was chosen in preference to the use of a camel-hair brush, as the amount of pollen obtainable in the case of the mango is very small and would possibly be lost in the hairs of the brush.

When the stigma had been successfully covered with the pollen the paper bags were quickly replaced. These were allowed to remain for several days, until the ovary commenced to swell; they were then removed and replaced by fine muslin bags. In all 145 flowers were operated upon as described. This extended over a period of two months.

On the ninth day from emasculation, the bags were removed in each case and the flowers examined. It was then found that the majority of them had been shed and only a total of twenty-four out of the 145 commenced to swell.

The swelling of the ovary is, I believe, commonly regarded as a sign that successful fertilization has taken place. In the present case, however, thirteen of these ovaries ceased to develop and finally withered after having doubled their normal size. This swelling was probably due to some irritation being caused by the growth of the pollen tubes.

Eleven fruits continued to develop, but unfortunately very strong winds set in and destroyed seven of the most promising when they were about half developed. With great care four fully developed fruits were obtained but only two were successfully germinated.

Complications due to polyembryony had been anticipated, but only a single seedling developed in each case.

Experiments are in progress, the results of which are hoped to further our knowledge in solving this problem of the polyembryony of the mango. In the absence of information to the contrary, it would have been assumed—had it been necessary—that the strongest of the seedlings was the "normal," believing it to have been the result of the fertilization of the egg-cell.

The two plants obtained have been planted out and are making good growth. When they have developed sufficiently, steps will be taken to induce early fruiting so that this work can be carried on to its final issue.

COTTON-GROWING IN ARGENTINA.

The information below is part of a report by H. M. Consul at Buenos Aires, reproduced in *The Board of Trade Journal* of September 5:

Cotton-growing in Argentina cannot be said to have emerged from its initial stage of development, but indications are not lacking of a possible flourishing and profitable industry in the future. Unfortunately Argentina does not possess the population needed for the development of her latent resources and is dependent upon immigration. The lack of labor is undoubtedly the most serious obstacle to the expansion of cotton-growing in the Republic. The only available local labor is supplied by a few native Indians and peasants from Paraguay and the Province of Corrientes. Apart from this difficulty cotton would seem to offer extensive possibilities, the vast districts of the Argentine lying to the north of the 32nd degree of south latitude being admirably adapted to its growth. The climate is particularly favorable to the cotton plant, the absence of rain at the critical ripening period conducing to the production of fibre of almost unrivalled quality. The greatest advantage of all is beyond doubt the total absence in Argentina of the much dreaded boll weevil, to the ravages of which is attributed the loss of a large part of the cotton yield of 1911 in the Mississippi valley alone. While this scourge is spreading throughout the entire cotton belt of the United States, causing millions of dollars of damage, the only parasite in Argentina detrimental to the cotton plant is a cotton worm that is easily exterminated by the use of Paris green.

The area under cultivation in the United States amounts to 30,000,000 acres and the same extent of territory is available for cotton-growing in Argentina. A Spanish syndicate in Barcelona has sent a commission of experts to Argentina to study the industry, more particularly from a labor standpoint, a fact that tends to show how seriously the problem is being grappled with, particularly when taken in conjunction with the large Spanish immigration into that country, amounting to 102,277 in 1911.

The future success of the industry would, of course, lie in cultivation for export, and the aim of the Barcelona syndicate would be to draw supplies of raw cotton from Argentina instead of the United States. At present cotton is being grown on a scale that falls a long way short of even satisfying the modest demands of the home market.

Out of about 6,200 acres at present under cultivation some 4,700 acres fall to the share of the Chaco territory. An expert comparison of the rich alluvial soil of this territory with that of the Mississippi valley leaves no room for doubting its productiveness. The principal centres of the cotton-growing industry are in the colonies of Resistencia, Benitez Margarita, Belen, Popular,

Pastoril, Zapallar and General Vedia. A government experimental station has also been started in the Chaco territory to supply seed which will be distributed, on application, by the Ministry of Agriculture; the industry is at present exempt from taxation.

The Government have started agricultural colonies in the Chaco territory. These colonies may be occupied by settlers, who have a right to apply for a grant of land on payment of $2\frac{1}{2}$ dollars per hectare (about 1s. 9d. per acre). This concession is offered to settlers who comply with the law. Applications should be made to the Land Office, Calle Tucuman 950, Buenos Aires, but the only way to secure the land appears to be by first settling thereon and then making application for a provisional lease. This lease is only granted provided the land is entirely free from any previous lien thereon.

The Government have also allotted a large tract of land, some 2,500,000 acres in extent, to be divided up into lots of 5,000 acres and sold by auction in Buenos Aires to the highest bidder. The price of the land is payable in half-yearly instalments according to the decree at present in force.

This region will be traversed by a railway under construction from Barranqueras in the Chaco territory to Metan in Salta. As soon as the railhead reaches the 127th mile connection will be made with a branch line of the National Central Railway, thus establishing communication between the Northern provinces and the deep waterway of the Parana river, which will have a stimulating effect upon the industries of the district to be opened up.

The date of the sale by auction of the lands above referred to will be fixed as soon as the surveys of the new railway are complete, and will be announced at least three months before the sale takes place. The surveys will probably occupy a period of from three to six months.—*The Agricultural News*.

PROBLEMS OF ECONOMIC IMPORTANCE REGARDING PLANT DISEASES.

(From the *Agricultural News*.)

In his presidential address* to the British Mycological Society delivered in 1911, Professor Salmon states and illustrates, among others, four practical problems connected with certain aspects of the life-histories of economic fungi. Although these problems were all considered and illustrated with reference to economic mycology in England, yet in themselves they are equally important in connection with plant pathology in the tropics. Stated shortly they are as follows:

* Transactions of the British Mycological Society, 1911.

"What is the economic importance of that specialization of parasitism now proved to exist in many fungi?"

"What degree of importance, from the economic point of view, is to be attributed to the *saprophytic* stage in the life-history of any fungus causing a plant disease?"

"What are the conditions under which some saprophytic species of fungi become parasites?"

"What are the conditions under which a parasitic fungus attacks a new host species?"

Some few words of explanation are necessary to elucidate the subject involved in the first problem. It has been shown by inoculations, notably among members of the rust family (*Uredineae*) and of the family of powdery mildews (*Erysiphaceae*), that of a fungus species occurring on a large number of host species one form on a host species *a* cannot attack a host species *b*, and vice versa. Thus although the two forms of fungus cannot be distinguished from one another by their morphological characters, that is by those characters that together may be said to make up their general appearance, yet biologically they are different in that their powers of parasitism are very strictly limited. The economic aspect of this is that if the host species *a* and *b* are growing together and only the biological form of fungus parasitic on *a* is present, then the species *b* will appear immune. But if the fungus strain parasitic on *b* is also present or is introduced, *b* also will be attacked or its immunity will appear to break down. There is, moreover, another means whereby *b* might become attacked from *a*. It has been found in some cases that the fungus parasitic on *a* can attack a third species *x* and that when it has grown on *x* for one or more generations, spores from *x* can infect *b*. Thus *x* serves as a bridging species to carry the fungus from *a* to *b*, and the introduction of *x* into a cultivation where *a* is attacked and *b* is immune would naturally result in the breaking down of *b*'s immunity. Finally, it has also been shown that the immunity of the species *b* to the fungus strain on *a* may be partly broken down, if the parts of *b* liable to attack are damaged by adverse conditions, wounds, or the depredations of insects.

Very little, if anything, is known of the existence of biological species in the tropics; yet the matter is clearly worthy of attention, particularly in relation to the production or introduction of immune varieties of host plants and in considering legislation restricting the introduction of plants from one country into another. These applications are so evident that they do not call for further elaboration here. In conclusion it may be added that the related genera *Colletotrichum* and *Gloeosporium*, to mention only two, might well repay investigation from this point of view.

The next point raised by Professor Salmon is that of the degree of importance, from the economic point of view, of the saprophytic stage of a fungus causing a plant disease. It has been found that the mycelium producing conidial fructifications

of a fungus may live as a parasite, while that producing the ascigerous fruit lives as a saprophyte on dead and often fallen portions of the same plant. In countries with a very marked change of climate in summer and winter this power may be of considerable economic value, since the saprophytic stage may serve to carry the fungus through the winter and give rise to new outbreaks of disease in the succeeding spring. In mild winters the parasitic stage may persist, but under extreme conditions the saprophytic form may alone be able to survive. An investigation of this problem is of more importance in temperate countries than in the more uniform climatic conditions of the tropics, yet even there it should hardly be entirely neglected. It is possible, for example, that definite knowledge of the part played in spreading infection by the ascospores of *Rosellinia bunodes*, the black root disease fungus, would be of value. The perithecia in this instance always develop on a saprophytic mycelium, some time after the tree is dead. Their growth is slow and the spores have a thick outer coat—all facts which point to this stage as intended to carry the fungus through unfavorable conditions. It would appear, however, that most fungi perpetuate themselves in the tropics largely by means of conidia, since the ascigerous stage is often either entirely absent or only rarely formed.

The question of the conditions under which some saprophytic species of fungi become parasites is one of very great importance in the tropics, and one on which some information, of a rather preliminary nature, has been obtained. Quite a large number of the more serious diseases of crops are caused by fungi that are far more usually saprophytic than parasitic in habit. As an example may be taken the ubiquitous *Thyridaria tarda* found as a saprophyte on an immense number of different plants, and as a wound parasite on cacao, Hevea and tea, among other hosts. Its parasitism is largely dependent on conditions unfavorable to the growth of the host, as well as on other factors. Again, the root disease of Para rubber in the East is due to a fungus (*Fomes semitostus*) usually saprophytic on forest stumps. Its parasitism depends on the presence of large quantities of decaying wood which afford it food for vigorous vegetative development before it begins its attack, and on the presence of an ample supply of moisture. The same is probably true to some extent of *Rosellinia bunodes* referred to above. The solution of the problem in connection with many species of the family of bracket fungi (Polyporaceae), to which *Fomes semitostus* belongs, is a matter of some importance in the tropics, as many of them appear to act occasionally as wound parasites or as root parasites on trees planted in newly cleared forest land. Similar investigations would be valuable in the case of many of the toadstools (Agaricaceae) and of the genera *Colletotrichum* and *Gloeosporium*, of which many forms are found on ripe or fallen fruits.

Of the last of Professor Salmon's questions, namely, what are

the conditions under which a parasitic fungus attacks a new host species, nothing appears to be known in the tropics, since the records as a rule do not go back far enough to show that when a parasitic fungus is found on an apparently new host plant, it has never actually occurred on that host before in the same locality, or in some other. This again is a problem worthy of attention.

Other problems of some economic importance also occur in connection with the life-histories of fungi, besides those mentioned by Professor Salmon. One is: to what extent a strain of a parasitic fungus may lose its virulence when growing for some time on the same host plant in a limited area, exhibiting fairly uniform conditions of climate. Another is: to what extent do strains showing very marked differences in virulence occur in one species of parasitic fungus. While yet another is: to what extent do certain species of partly parasitic fungi, such as *Thyridaria tarda*, found throughout the tropics on several host plants and originally probably pure saprophytes, exhibit before our eyes a process of developing parasitism, becoming at the same time specialized to the host plant predominating in any given locality. So many partly parasitic fungi are of universal distribution in the tropics, and are capable of attacking several host plants, that it seems very possible that some of them may actually afford instances of the progress and specialization of parasitism.

The investigation of problems of the nature of those just considered belongs in a sense to the realm of pure research, and requires more time than is usually available to the plant pathologist engaged in pioneer or routine work. In fact such investigation bears much the same relation to routine plant pathology that medical research does to the work of a general practitioner. The future may prove that the parallel can be carried farther, and that the solution of these problems is as important to the economic welfare of an agricultural community as the results of medical research are to its bodily health.

A SUGAR-CANE PEST IN ST. CROIX.

Dr. Longfield Smith, Ph. D., Director of Agriculture, St. Croix, Danish West Indies, in correspondence with the Imperial Commissioner of Agriculture, has given a brief account of an insect which occurs in that island as a pest of sugar-cane.

The insect is a large, brown beetle, the name of which Dr. Smith gives as *Strategus titanus*; it belongs to the same family as the common hardback (*Ligyrus tumulosus*). The larva of *Strategus titanus* is in shape and general appearance similar to the typical larvae of insects in this group, but it is much larger than the common hardback larva, attaining a length of over 2 inches, while it is about one-half inch in thickness.

The insects of this group, Dynastides, are more often scavengers, feeding on decaying organic matter, than actual pests feeding

on the living tissues of plants of economic importance. When, however, they do occur as pests the injury to plants is usually the result of the feeding of the grubs on the fine roots after the manner of the related insects of the Melolonthid group, of which the brown hardback (*Phytalus smithi*) and the May beetles (*Lachnosterna patens* in St. Vincent and *L. patruelis* in St. Kitts) are examples. In the case of the sugar-cane beetle (*Ligyrus rugiceps*) of the United States, however, the injury is reported to be due to the adults tunnelling into the base of the stem. The injury to canes in St. Croix by *Strategus titanus* is different from both these. The habits of this insect are stated by Dr. Smith to be as follows: "It occurs very abundantly, much to our disadvantage. It (the larva) eats the roots of canes, sweet potatoes and other plants and burrows into the bases of the cane shoots, eating its way upward, and turning the cane into a hollow tube. The insect is saprophytic as well as parasitic. I have found it living in decaying megass heaps. At present (September 18) the grubs do not seem to be so abundant as they were, probably because many have turned to beetles, which are now busy laying eggs."

There would seem to be no doubt that *Strategus titanus* is capable of becoming a very serious pest, and it is obvious that every effort should be made to prevent the introduction of this insect into any colony where it does not at present exist.—*The Agricultural Notes*.

ROBUSTA COFFEE.

Testimony seems to be abundant that *Coffea Robusta* is a money producer that should receive a larger attention in Mindanao. It is a rapid, thrifty grower, an early producer, doing best under rich, alluvial, well-drained soils, thrives from sea-level up to 3000 feet altitude and does best with shade when young. Planted at corners of 12-foot squares with an additional plant in the centre, the yields, in the second year from planting, are 150 pounds of coffee per acre, and increasing annually to 2100 to 2400 pounds per acre at six years.

The tree is much freer from diseases and pests than other varieties of coffee, the fruit shells easily and is borne in thick bunches giving facility in gathering. No expensive machinery is required in the treatment of the berry. The quality is that of medium Arabian and sells at about 10% below good Java; but the ease of production more than offsets the difference in market value.

Coffea Robusta should make a good intercrop with cocoanuts and rubber. It should be planted not nearer than seven feet from rubber and a greater distance from cocoanuts.

When planted with rubber the latter would shade the coffee out in about 5 years but in the meantime the coffee pays a good dividend while the rubber is maturing. With cocoanuts planted 30 by 30 feet the intercrop coffee should continue yielding much

longer, particularly if planted six feet apart in rows running East and West so as to secure a maximum of light.

The evenly distributed rainfall, favorable to rubber and coconuts, suits the Robusta coffee the best.

This variety has made most excellent growth and yield in Basilan and would no doubt do well all over Mindanao where droughts are not pronounced and where volcanic soil rich in vegetable matter prevails.—*Mindanao (P. I.) Herald*.

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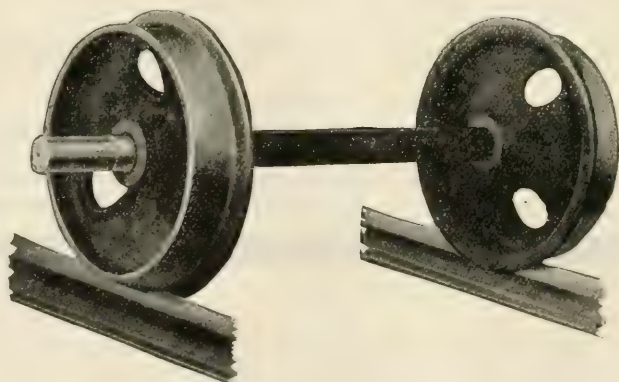
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Any one or all of the publications listed below (except those marked •) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- * "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp. cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

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- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 8 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IX.

DECEMBER, 1912.

No. 12.

With agriculture in the broad as the mainstay of Hawaii, it is strange that the legislature is always disposed to trim the appropriations for the agricultural service to the bone.

One infected animal out of thirty-two head of dairy cattle tested for tuberculosis in November speaks eloquently for the campaign of the past three years to cleanse the dairy herds of Oahu. In all probability, the coming year will see the campaign extended to the other islands.

Surely, with the millions invested in live stock in this Territory, the legislature ought to be able to find the salaries for veterinarians in all stock-raising districts. At present the assistant territorial veterinarians employed are paid in part by planters and ranchmen, who already pay their share of general taxes for the upkeep of all public services.

At the last meeting of the board of agriculture and forestry, the projects of erecting animal quarantine stations at Hilo and Kahului were reported as making satisfactory progress. The plans for the Hilo station are in hand and the lease of the Kahului station site will soon be executed. With Hawaii and Maui thus provided for, Kauai will next be in order to equip for direct live stock importing.

With the earnest coöperation of the sugar planters' association, the board of agriculture and forestry will make special efforts the coming year in protecting the forests and sources of water. At its meeting this month, in response to a resolution of the planters' association communicated to it, the board appointed President W. M. Giffard, Albert Waterhouse and H. M. von Holt as a committee to coöperate with a committee of the planters in this work. The planters' committee consists of Albert Horner, E. D. Tenney and E. Faxon Bishop.

Two things of great importance are shown in the report of the assistant territorial veterinarian on importations of live stock in November. One is the progress being made in the improvement of beef and dairy stock, indicated by the introduction of

thoroughbred bulls by several breeders and dairymen. The other inference from the report is not so gratifying, in that it shows the importing of animals and fowls in large numbers which might all be raised in the islands.

An interesting article appears in this issue, by O. W. Barrett, chief of the Philippine division of horticulture, on needed name standards. Wrong names are among the most curious things in philology, and it is harder to stifle the popular usage of one of them than to kill a cat. It is more difficult to get "coconut," for instance, into a newspaper proofreader's "cocoanut" than Dr. Johnson said it was to drive a joke into a Scotchman's cranium.

In its first year the Forester gave considerable advocacy of co-operation on the part of small farmers in Hawaii, with special reference to establishing standards of packing fruits, etc., and to the advantageous marketing of products. In this issue will be found an interesting article on coöperation in agriculture, with special reference to India. It will be noticed that, while state aid to such coöperation is held by the writer of the article to be desirable to some extent, a completely self-reliant movement is regarded as the ideal—government assistance being considered by him as only a means to an end which "can never be a substitute for popular inspiration and direction."

At the recent meeting of the Hawaiian Sugar Planters' Association, contradiction was given to an imputation of undue secrecy regarding the operations of the association's experiment station. Refuting evidence was in part that of the issuance of bulletins of results of experiments. Interesting corroboration of this is found in four late numbers of the *Agricultural News*, organ of the Imperial department of agriculture for the West Indies. Bulletins of the station mentioned are quoted—one on the relation between the crushing of cane and the volume of the fibre, another (the annual report) on the hibiscus in Hawaii with reference to the hibiscus exhibition here, a third on manganese in Hawaiian soils, a fourth on the influence of molasses on nitrification in cane soils and a fifth on the fuel value of megass. Evidently the Hawaiian sugar planters are doing their full share in making Hawaii known abroad.

It makes the imagination shudder to picture the condition that might exist in Hawaii if there were no division of entomology, with strict inspection of imported plants, to ward off invasions of pests. When the many pests intercepted each month by this division are considered, it may fairly well be concluded that the absence of protective measures would simply mean that agriculture and horticulture would be impossible in these islands. There is also to be remembered the invaluable work done, both

by the government entomologists and those employed by the sugar planters, in exterminating or controlling such enemies of vegetation as have gained an entrance to the group. This eternal vigilance and this interminable warfare mean untold millions to the wealth of Hawaii. Like remarks would fit the work of the division of animal industry in combating and repelling the maladies of live stock, several known ones among them being menaces also to human life. If it were not for the unceasing vigilance and exertion of those directing this division, it would be a matter of but a short time when there would not be a head of live stock in the islands worth a week's purchase.

COLLEGE OF HAWAII AS PROMOTION ASSET.

In a former number of the *Forester* comment was made on the advocacy by *Tropical Life* (London) of agricultural colleges in the tropics, with the suggestion that the College of Hawaii, eventually, might be in a position to bid for students from distant parts for training in specialized tropical agriculture. Students of this institution would have an advantage over similar colleges elsewhere, from being in touch with the highly developed experiment station of the sugar planters here. H. Hamel Smith, editor of *Tropical Life*, in a letter to the *Westminster Gazette*, urges the need of agricultural colleges in the tropics for the benefit of Englishmen desirous of entering a career of tropical agriculture. In the following remarks, extracted from his letter, there is the germ of a big idea in Hawaiian promotion for development with regard to the College of Hawaii:

"The very fact that one or more agricultural colleges have been established in the tropics would attract the attention of an energetic, ambitious, and extremely useful class of capitalist to those centers as channels for investment and trade. These at present hold aloof because they see no reliable means of training themselves for such a life. With many fathers of families having sons to place out in the world, or younger men with capital, once they can see their way clear to obtain a good return on the labor and money they are willing to expend on one or other of the tropical agricultural industries, a very large number, with only a few thousands to invest, would be willing to pay for their training first at an agricultural college on this side on general principles, and then at the college in the tropics to specialize."

DIVISION OF ANIMAL INDUSTRY.

GLANDERS IN WAIPIO VALLEY.

Honolulu, Dec. 11, 1912.

Mr. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry, Honolulu, T. H.

Sir:—In compliance with instructions received I returned to Waipio Valley on November 13th.

As outlined in my last report it was to be feared that many, if not all, of the horse stock belonging to the Chinese rice planter Akaka was suffering from or at least had become affected with glanders from the seven clinical cases which I had destroyed on my previous visit.

The quarantine of the Valley has been continued, no horse stock from there being allowed to pass the Hamakua gate leading to Waimea and only the pack animals belonging to the taro planters, all of which had been found to be sound, had been allowed to carry paiai as far as Paauhau and to return immediately.

The first step upon my return was therefore to reinspect these animals, 41 in all, which was done at the mouth of the Valley at the top of the trail. When the animals fully loaded have climbed this steep trail, a continuous effort requiring about three-fourths of an hour, they are sure to show symptoms, especially a discharge from the nose, which otherwise might remain concealed; but, as stated, they were all found to be sound.

As far as Akaka was concerned there remained quarantined at his place twenty-eight horses and one mule colt. One animal had died since my previous visit and three showed physical symptoms of the disease not visible when they were first examined. It was decided to submit all of these animals to the intradermal mallein test, a method which originated with this division. I first injected the saddle horses which my assistant and myself were riding, animals known to be absolutely sound, after which with the same syringe and with mallein out of the same bottle the twenty-eight animals belonging to Akaka were injected. This was no easy matter, as the operation is very delicate, requiring the use of an extremely fine hypodermic needle, and several of the animals had to be thrown down in order to secure them sufficiently to allow of the needle being inserted into the hide without penetrating it. On this point the success of the operation depends. If the needle penetrates the hide no reaction is obtained no matter how severely the animal might be affected. Only two drops is injected, generally on the side or the neck, the place of operation having first been disinfected.

The test proved an absolute success. Within one hour from the time of injection the minute swelling, originally the size of a

small pea, had enlarged to the size of a hazelnut and in a number of cases the swelling had reached dimensions of four to five inches before we left the Valley that evening.

When the animals were seen again early the next morning they presented a very sorry appearance. In most of the cases the swelling was so painful that it was almost impossible for the animals to move the leg, and when approached for manipulation several of them nearly fell over in order to avoid being touched. In extremely contrasting condition were the swellings exhibited by my saddle horse and those of my assistants which had been injected at the same time. The swellings were barely the size of a bean and were neither sore nor hot.

This test must be considered an absolute triumph, and I have no doubt will be adopted the world over as soon as it becomes known. The method was first suggested by Dr. Case as a direct result of our work with the intradermal method of tuberculin testing. There is, however, a decided difference between the two tests, especially in the speed with which the mallein test appears and, furthermore, in the size of the swelling resulting from the injection. It can easily be understood, especially in a case like the present one where a man was going to be deprived of practically all of his work animals, depending upon whether they reacted to a test of which he had no knowledge whatever, that the fact that he could see for himself and compare their appearance with those that we were riding, that the method is far more satisfactory than the old subcutaneous method, which depends upon a series of temperatures being taken before and after injection, and which are absolutely unintelligible to an ignorant layman. There was consequently no objection, even though two of the animals did not give a decided reaction. These two were, however, retested two days later when they were found to respond to the test as well as any of the others. This demonstrates that in the first test the mallein must have escaped from the small pocket in the hide before it had time to set up any inflammation.

At this same time three more horses, also belonging to Akaka, the possession of which seemed to have escaped his mind, had been located and were found to react to the test. Further action pertaining to this matter is contained in my report to Mr. Waterhouse, acting chairman of the board, of November 21 and 29.

Instructions had been received by wireless message to have the animals appraised and for this purpose I appointed a committee consisting of Deputy Sheriff Lindsay from Waimea, Mr. R. S. Renfrew and Yung Hin, the latter representing the owner. Every animal was appraised separately and the value written on a piece of paper by each member of the committee, and handed to me, who folded and took charge of them for further use. It has, however, been reported already that the aggregate of the 28 animals came to \$1,765, or approximately \$61 per head. This sum therefore would constitute the basis upon which to attempt

to obtain indemnification for Akaka by the coming legislature. But it is needless to say that with the present price of horse stock hardly half of the number destroyed could be purchased with this sum of money.

On November 26 I received a wireless from Mr. Waterhouse instructing me to kill the animals referred to in my letter of November 21, stating that it was probable that Akaka would receive assistance in securing other animals. In the meantime a large grave had been dug in the sand near the beach in Waipio Valley and on the 27th all of the animals were taken down there and destroyed and buried.

The subsequent work consisted in the total dismantling of Akaka's stables. By the courtesy of the board of health thirty pounds of corrosive sublimate were obtained and a trough built in which to dissolve the disinfectant so that all boards and other lumber which had been used in the old stables might be thoroughly soaked and disinfected before being placed in the new.

A virgin piece of ground at some distance from the old location and at a considerable elevation over the same was cleared and leveled for the erection of the new stables.

As stated in my report of November 21, I had all of the horse stock in Waimaunau Valley rounded up under the supervision of a police officer accompanied by three cowboys. Only 17 head of horses and donkeys were found, altogether, and all of them were found to be perfectly sound. The remaining days were spent in repeated inspections, and I feel certain that no cases of glanders remain in the Valley so far as it is possible at all to ascertain. It is, however, recommended that the animals in the Valley be inspected again, at least twice, at intervals of two or three months.

Upon my return I was pleased to meet Mr. O. Sorenson, assistant manager of the Parker Ranch, who informed me that he had been designated to act as an agent for a number of plantations as well as the Parker Ranch and the Hawaii Irrigation Company, for the purpose of purchasing horses wherewith to enable Akaka to harvest his rice crop, thereby saving him from unnecessary loss. Mr. Sorenson requested me to return to Kukuihaele with him, but as I considered Mr. Renfrew, the board of health inspector, perfectly capable of furnishing him all required information I decided that it would be better to return to Honolulu.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Dec. 3, 1912.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,
Honolulu, T. H.

Sir:—I beg to submit herewith the following report for the month of November:

Tuberculosis Control.

Thirty-two head of dairy stock have been submitted to the intradermal test during the month, the results of which appear below in tabulated form. Most of these animals are newly purchased cows from Kona, Hawaii:

| | T. | P. | C. |
|--|----|----|----|
| Oct. 30–Nov. 2—P. M. Pond..... | 4 | 4 | 0 |
| Nov. 10–Nov. 14—C. M. White..... | 1 | 1 | 0 |
| Nov. 12–Nov. 15—Bernal Stock Co..... | 8 | 8 | 0 |
| Nov. 12–Nov. 15—H. B. Brown..... | 7 | 6 | 1 |
| Nov. 12–Nov. 15—F. Grouviera | 3 | 3 | 0 |
| Nov. 26–Nov. 29—P. M. Pond | 5 | 5 | 0 |
| Nov. 26–Nov. 29—Bernal Stock Co..... | 2 | 2 | 0 |
| Nov. 26–Nov. 29—A. Bomke | 2 | 2 | 0 |

The one condemned animal taken from Mr. Brown's dairy was purchased by him from the F. M. Swanzy Ranch, Koolauloa. This ranch and the Kaneohe Ranch are two places where little testing has been done, principally because they have held their drives at times when we were busy testing at other points on the island. There are undoubtedly some tuberculous animals on each of these two ranches, and we expect to make a complete test upon their next drives.

Inspection Service.

In connection with the inspections of live stock entering this Territory the captain of the S. S. Ventura and Maurice Brasch, a passenger, were fined fifteen dollars and costs each because of the violation of certain of the rules and regulations of this division pertaining to the furnishing of a list to the inspector and the quarantining of all dogs entering the Territory. A minimum fine was imposed as it was a first offense, but it is hoped from the publicity given the affair that a similar occurrence will be prevented.

Because of failure to furnish the inspector with a list of live stock consigned to this Territory, thereby imposing upon the inspecting officer considerable unnecessary work, it was deemed advisable to write to the companies concerned a letter asking that

more attention be given to this subject by steamship officials. Consequently a letter was prepared for and signed by the president and executive officer of this board, and sent to the following steamship agencies: Castle & Cooke, C. Brewer & Co. and H. Hackfeld & Co. A copy of the letter sent to H. Hackfeld & Co. was sent to Mr. Schwerin, general manager of the P. M. S. lines of San Francisco. Copies of these letters are herewith attached to the original of this report.

List of Live Stock Imported During the Month.

- S. S. Mexican, Tacoma and Seattle, Nov. 6—24 mules, Schuman; 6 Hereford bulls, P. Isenberg.
- S. S. Honolulan, San Francisco, Nov. 6—15 horses, Honolulu Const. & Draying Co.; 2 horses, Standard Oil Co.; 1 Holstein bull, P. Isenberg; 1 Holstein bull, P. M. Pond; 1 dog, Dr. Aiken, Hilo, Hawaii; 12 crates poultry.
- S. S. Kilauea, San Francisco, Nov. 6—1 crate white Leghorns, Capt. Nelson.
- S. S. Sierra, San Francisco, Nov. 10—4 dogs, P. Isenberg; 1 dog, T. B. Buck; 9 crates poultry.
- S. S. Manchuria, San Francisco, Nov. 15—1 cat, W. E. Wall; 4 crates birds, W. Macfarlane.
- S. S. Lurline, San Francisco, Nov. 21—34 mules, Schuman; 1 Belgian stallion, C. B. Miles, Hilo, Hawaii; 37 crates poultry.
- S. S. Tenyo Maru, Orient, Nov. 25—2 crates Japanese games.
- S. S. Ventura, San Francisco, Nov. 25—1 crate turkeys, W. F. X. Co.; 1 dog, W. F. X. Co.
- S. S. Wilhelmina, San Francisco, Nov. 26—1 crate turkeys, E. D. Tenney.
- S. S. Hilonian, San Francisco, Nov. 26—22 mules, Schuman; 6 horses, Macpherson; 2 horses, California Feed Co.; 1 Holstein bull, P. M. Pond.

Respectfully submitted,

LEONARD CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Nov. 30, 1912.

Honorable Board of Commissioners of Agriculture and Forestry,
Honolulu, T. H.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of November, as follows:

During the month there arrived 33 vessels of which 23 carried vegetable matter and one vessel clean sand for cement work.

The usual careful examination was made with the following results:

| <i>Disposal with Principal Causes.</i> | <i>Lots.</i> | <i>Parcels.</i> |
|--|--------------|-----------------|
| Passed as free from pests..... | 1168 | 27,390 |
| Fumigated | 18 | 328 |
| Burned | 53 | 74 |
| | <hr/> | <hr/> |
| Total inspected | 1239 | 27,792 |

RICE SHIPMENTS.

During the month 25,463 bags of rice arrived from Japan which was found free from weevil and passed.

PESTS INTERCEPTED.

Sixty-two packages of fruits and vegetables were found in baggage of foreign passengers and immigrants and all were destroyed by burning. We found several lots of chestnuts from Japan badly infested with weevils. Some apples from Japan were infested with a fungus resembling the bitter rot. On a shipment of plants from Manila we found mealy bug (*Pseudococcus virgatus*), the bamboo scale (*Asterolecanium bambusae*), a leaf bug (*Capsus* species) and some ants. One queen bee arrived from Yokohama and on examining the package was found dead. It was thought advisable to burn the box with the bees.

HILO INSPECTION.

Brother M. Newell reports the arrival of seven vessels—six steamers and one sailing vessel. Five steamers carried vegetable matter consisting of 174 lots and 3247 parcels. One hundred and eighty-five sacks of potatoes were not very clean and the consignee had to sort them over. Two cases of cauliflower were infested with caterpillars and were destroyed.

INTER-ISLAND INSPECTION.

During the month of November 62 steamers were attended to and the following shipments were passed: Plants, 60 packages (mostly forestry trees); fruits, 4 packages; taro, 798 bags. Total, 862 packages inspected and passed.

The following packages were refused shipment: Various fruits, 24 packages; plants, 18 packages; lily root, 1 package (clinging dirt). Total, 43 packages inspected and refused.

Our honorary inspector, Mr. Robert R. Elgin, at Mahukona,

Hawaii, has left Mahukona and I would recommend that Mr. E. Madden be appointed in his place. Mr. Madden is Mr. Elgin's successor at the Mahukona railroad depot.

Respectfully submitted,

E. M. EHRLHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

REPORT OF FOREST NURSERYMAN.

Honolulu, November 30, 1912.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry, Honolulu, T. H.

Dear Sir:—I herewith submit a report of the work done during the month of November, 1912:

Nursery Distribution of Plants.

| | In seed boxes. | In boxes transplanted. | Pot grown. | Total. |
|------------------|-------------------|---------------------------|---------------|-------------|
| Sold . . . . . | ..... | 700 | 50 | 750 |
| Gratis | 5000 | 200 | 481 | 5681 |
| | <u>5000</u> | <u>900</u> | <u>531</u> | <u>6431</u> |

Collections on Account of Sales of Plants and Dead Wood from

Tantalus.

| | |
|--|-----------------|
| On account of plants sold. | \$ 10.25 |
| On account of sale of dead wood taken from Tantalus. . . | 100.00 |
| Total | <u>\$110.25</u> |

From the 1st to the 9th of the month all hands were busy attending to the delivering and shipping of trees for Arbor Day planting. An account of the distribution is given in special report under date of November 11.

Experiment Garden, Makiki.

One man from this station, also the wagon man with horse and wagon, were assisting at the Nursery for about two weeks during the Arbor Day rush.

Tantalus Forest.

The cutting down of the dead trees in the forest is complete with the exception of a few scattering trees which will be cut down and used for firewood in sterilizing soil at Makiki station. One hundred cords have been sold to Mr. Tanabe who cuts it up and sells it for firewood.

The matter of people taking soil from the government lands on Tantalus has been investigated. After an examination of the lands along the main road and trails we have not been able to find any indications that would lead us to suspect that soil has been removed. The main road has also been watched but without success. One Japanese was found in town who was selling soil at 75 cents per bag. This soil he assured us came from Mr. Frank Cooke's place in Palolo Valley and that he had received permission from Mr. Cooke to take it.

Plantation Companies and Other Corporations.

During the month orders have been received for 30,000 eucalypt seedlings and we have distributed 64,000 seedlings in seed boxes and 13,000 trees in transplant boxes ready to set out.

U. S. Experimental Planting, Nuuanu Valley.

One day with all the available men at the Nursery and Makiki was spent in planting more varieties of eucalyptus. The eighteen new species of eucalyptus planted on this plot are with few exceptions doing very well and will soon be large enough to take care of themselves.

The writer spent one day at Nanakuli inspecting the work that is being done in thinning the algaroba forest. The Japanese contractor is working according to contract and is anxious to do satisfactory work.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

*COÖPERATION IN AGRICULTURE.**HISTORY OF PROGRESS.*

There has recently been published a collection of monographs* which trace the history of the coöperative movement in the principal countries of the world. The volume is commended to the attention of those to whom agricultural interests appeal. It is a

* Monographs on Agricultural Coöperation in various countries, published by the International Institute of Agriculture, Rome.

revelation of the power of a new economic force which has its beginnings in remotest history.

To the ordinary Englishman the word coöperation suggests vaguely a form of urban shop-keeping. In Great Britain co-operative methods have made little headway outside the towns. The country is still one of large holdings farmed by men, individualists by instinct, who have not yet felt the need of combination. If the movement towards small holdings, inaugurated by the act of 1907 and officially blessed by both parties, develops, it will shortly be found that an effective coöperative organization is an indispensable condition of success. But for the present we must look to Ireland and to foreign countries in order to see what coöperation in agriculture can effect.

These monographs tell the story; it is a plain tale of facts and figures, all the more remarkable because it covers a period of little over 50 years. Last century was one of awakening and activity in every branch of human affairs. The strain and competition and the progressively centralizing tendency of commerce and industry reacted on the agricultural world. The stress of life grew steadily harder: a growing population demanded more intensive cultivation and a more productive soil, and these could be obtained only by utilizing the costly improvements of technical science; while the increasing opposition of the commercial world and the growth of outside economic concentration compelled the closest attention to the interests of agriculture. Had the small farmer clung to his isolation he would have gone to the wall. Fortunately, when the economies and saving power of association for common ends were demonstrated to him, he developed a genius for it. The amazingly rapid development of coöperation is the one great fact of recent agricultural history in Europe; it extends not to one or two countries, to certain branches of agriculture, but to every country where the small holder exists and to every department of rural economy. And the movement has been wholly for good. In towns association is to some extent a dividing force, applied to the defence and assertion of sectional and class interests at the expense of others. But in rural areas it is more purely utilitarian and is generally a bond uniting all classes.

CO-OPERATIVE WORK IN INDIA.

India, short though her coöperative history is, occupies a serious place in this volume. The inclusion of her monograph is useful, because it brings her methods and lines of work and results into prominent contrast with those of other countries. The comparison is instructive, and those who are interested in the Indian movement will find the volume suggestive and illuminating.

Of all the points of variance by far the most prominent is the

relation of the state to the coöperative movement. The uncompromising opponent of State assistance in any form will find no support in these monographs. There is no country which does not accord more than mere legislative recognition to the coöperative idea. The aid is rendered variously in different states, in the form of legal privileges, assistance in propaganda, financial facilities, direct subvention and otherwise. One may hold that the State aid is often unnecessarily and sometimes injudiciously given. One could prove that where the movement is strongest dependence on the state is lightest. Yet on the other hand it is not to be denied that the help of government has been of great service in most countries and especially to certain branches of coöperative work, and that but for that help coöperation would not be the vigorous growth that it is today. State aid is not a principle to be condemned or approved in the abstract. There is a time to give and a time to withhold aid. Like every other principle it is relative, and must be applied with direct reference to the circumstances of each country and people and the requirements of each form of coöperative activity.

STATE AID—WHERE POSSIBLE.

But the writers of these monographs hold no brief for State aid. Their straightforward narrative ought to convince the straightest theorist that there are circumstances in which such assistance is permissible and even advisable, and that it is a matter on which a man may not dogmatize. But no attempt is made to uphold State aid as a good thing in itself. On the contrary, the inference everywhere is that a completely self-reliant movement is the ideal, and that Government assistance is only a means to that end—it can never be a substitute for popular inspiration and direction. The essential thing to notice is that in Europe the initial impulse has invariably come from the people. The coöperative idea was evolved to meet changing economic conditions by those who actually felt the pressure of them. Only when that idea had been put to the test of practical working and its efficacy proved did the State come forward with its assistance, an assistance which was not always gratefully received. First and above all things the movement in Europe is a self-conscious and popular one, deriving its impetus from private enterprise and dependent upon its appeal to the people's sense of interest.

UNIQUE POSITION IN INDIA.

It is here that the Indian movement occupies a position by itself. The writer of the monograph on India sums up the progress made as "an illustration of State aid effectively administered rather than of organized self-help." We reversed the normal process by beginning at the top. Government not only intro-

duced the idea to India but appointed official Registrars to make it known and to organize and guide a coöperative movement. It was the only possible course. The condition of agricultural India obviously called for coöperative societies, although the people had not thought the matter out and there was no conscious demand for them. The great danger of the arrangement was the possible officialization of the movement. Every Registrar on his appointment at once becomes an enthusiast. He is convinced, and rightly, that a widespread coöperative system would mean the regeneration of the rural population. But he finds that the educated classes, the natural organizing agency, are apathetic, and the temptation to form societies by official means is strong. The reports show that in most provinces this temptation has been resisted. In India, as in every other country, the teaching of experience is that excessive artificial fostering produces a weakling growth. Government has shown the way. There are in every province the beginnings of a healthy movement, which grows more self-conscious every year, and which is gradually attracting the interest of the educated classes. The future rests with the people of India. An officially run movement on a wide scale is a thing unthinkable. A popular movement, appealing consciously to the interests of the agricultural classes, under general official guidance, but supported by the energy of numbers of local organizers, is eminently practicable. That is the ideal aimed at. It is certain that without that propelling popular force the movement can never have vitality or spontaneity.

INDIA IS PREDOMINANTLY AN AGRICULTURAL COUNTRY.

Agriculture in its many phases is by far the most important interest, and merits the greatest share of attention. Much has been done and more attempted to improve the situation, but the picture is still dark enough. The agriculturist, the pillar of the State, is paradoxically its weakest member. To the Mahajan's credit one may, almost without exaggeration, apply the celebrated phrase attributed to Louis XVI that it "supports agriculture as the rope supports the hanged." From first to last the ordinary ryot is dependent on that credit; he is scarcely even a free agent. His methods of cultivation are primitive and often wasteful, and in disposing of what crops he gets he can only accept such prices as the middleman chooses to offer. Weak and isolated, he is in no position to improve his fortunes. And the economic conditions are rendered harder to assail by the conservation of centuries and the improvidence that accompanies blank poverty. The picture has been painted a hundred times.

CO-OPERATION A FACTOR FOR UNITY.

It is possible that four years' work in connection with co-

operative societies affects one's sense of proportion. But there is no one who has taken part in the work who does not regard coöperation as incomparably the most promising means of attacking the agricultural problem. And a perusal of these monographs confirms that conviction. To compare agricultural Europe of the present day with the same Europe of the early nineteenth century is to gain fresh hope for India. If rural India is backward and her outlook discouraging, there was a time when continental Europe was little better. In the change, astonishing both in its magnitude and rapidity, that has taken place in the West coöperation is probably the most important factor. Rural credit has been organized. The coöperative society enables the small farmer to cultivate scientifically, to get good seed and manures and agricultural machinery at cheap rates, to sell his crops to the best advantage while avoiding the profit of the middleman, to manufacture his dairy produce and sell it in the best market, to improve the breed of his livestock and to insure his possession against all risks. These are only a few of the directions in which the coöperative principle has been applied. The movement encourages agricultural education and reaps the benefit in improved cultivation and a stronger and more intelligent force within itself. The societies form practically a huge unpaid agency for making known and bringing into practical use in all parts of the country the improvements of agricultural science and economy.

Unless such a development is regarded as attainable in India our present work is meaningless. We are still a long way off it, and before it is reached there is much to be done in the way of education and the breaking down of old prejudices and habits. But the instinct of association is deeply implanted in the people and the success that has attended the first experiments in coöperative credit offers the promise of greater things in other directions. Hitherto the departments of agriculture and coöperation have worked independently. In future their orbits must increasingly converge. When the scientific department has demonstrated the value of a particular method of cultivation or of an improved implement, the coöperative society ought to supply the channel, so greatly wanted, by which these improvements will be carried down to the ryots. Even now some use is made of the societies in this direction, and more might be done. If the two departments so work together, and if, most important of all, the people themselves and especially the more enlightened classes co-operate, the history of the next fifty years will have much to tell of improvement in the lot of the Indian peasantry.—*Agricultural Journal of India*, July, 1912.

SOME NEEDED NAME STANDARDS.

 BY O. W. BARRETT,

Chief, Division of Horticulture.

(The Philippine Agricultural Review.)

In the matter of stopping the usage of undesirable words prevention greatly excels attempted cure. Horticulturists in general regret that prompter action was not taken in regard to some words which have now gained so strong a foothold in the English language that it will be almost impossible to eradicate them. Botanical nomenclature is necessarily a more or less confused affair, but that is a matter for scientists themselves to worry over; whereas the terms and names in daily use in the line of horticulture, and for that matter in general agriculture, are words used by the majority of people. Here lies an interesting fact in the sociological, or rather the psychological, side of the question: we are always prone to associate one word with others which resemble it in sound or appearance, and by that association of ideas much good or ill may befall the object or word in question.

While it is true that there are plenty of cases of splendid profits being made, sometimes without a substantial reason therefor, through the fortuitous employment of a word or "catchy" phrase, there are probably just as many cases to the contrary. The writer has in mind, for instance, the case of a very promising industry that was said to have been ruined by the inadvertent use of the word "tubercle" instead of "tuber"; one can readily see that for a company to use, even accidentally, a word which is so frequently associated with a certain serious disease is to court disaster—even if we blame the result on phthisisphobia.

The following cases of misspelling, misapplication, and misuse of more or less good synonyms are worthy of interest.

Coconut.—Fortunately in the Philippines there is practically no need to warn the public against the old-fashioned spelling "cocoanut." The British forms of the word, "coco-nut" and cocoa-nut, should be discontinued as soon as possible, since strictly speaking, the object is a *fruit* just as much as a nut, and since it is now such a common and well-known article there is no excuse for inserting the hyphen any longer. By the same token *copra* is the correct name for dried coconut "meat"; the addition of "h" (British system or "x" (Spanish style) is neither decorative nor useful.

Cacao.—This refers not only to the tree itself but to the seeds produced therefrom. The term "cocoa" should be applied only to the product manufactured from the seeds—a trade term, like chocolate. By the way, the final vowel in "cocoa" is interesting as being one of the very few cases of an absolutely useless vowel

in English; the original suffixion of the "a" was possibly excusable to distinguish the word from the six or eight other dissyllables using "c," "o" and "a" in various combinations.

Avocado.—Objection to this word is gradually dying down, but, for some unknown reason, there still lingers in the minds of thousands of people an apparent preference for the hideous name "alligator pear"; this is probably due, however, to the plebeian shrinking from any foreign-sounding word, especially if it has more than three syllables. It is said that the first use of the abominable epithet was by one Jack Tar who had been allowed shore leave somewhere in Central America where the days are not alone in being hot, where alligators make lasting impressions, and where some of the people still call the fruit "ahuacate," after the old Aztec 'ahwacatl.' Yet because one tired tongue refused to encompass the full measure of the really euphonious *avocado* is no reason why a perfectly good fruit, which ought long ago to have been exceedingly popular, should continue to struggle under such an opprobrious name. By the same token, many of the avocado types have no more resemblance to a pear than to a plum or pomegranate either in color or shape, to say nothing of the interior. To illustrate the obstinate attitude of the retail merchant, the writer recollects a case in Washington, District of Columbia, where the disgusting sign "Fresh Alligator Pears Today" was flaunted in the people's face, year after year, although the proprietor admitted that most of the purchasers of the fruit asked for *avocados*.

Mango.—The plural of this word is properly written without an "e." There is no good reason for adding a useless "e" to the other analogous foreign words which would not, when at home, so to speak, be given such a decoration, viz, tomato, potato, pomelo, chico, baño, and, of course, avocado.

Pomelo.—This good old word has been discountenanced in most parts of the United States and a rather weird and quite unreasonable substitute has been upheld, even by a few horticulturists. This substitute flourishes as "grapefruit," "grapefruit," and "grape fruit." There are two theories anent the origin of this pseudonym: a gentleman at the Boston docks, coming upon a sample package of pomelos from the West Indies, and being quite unacquainted with the fruits, tested one and not having in mind just then anything else with which to compare the fruit declared that it reminded him of *grapes* (presumably of the Frost variety). The other and perhaps more reasonable theory is based upon a tourist's remark in passing some pomelo trees for the first time in the Tropics: noting that the fruits were sometimes clustered together near the ends of the branches he innocently opined that in that character they reminded him of *grapes*. The flavor, however, is so unlike that of any grape and the clustering habit of the fruit is so inconstant and so unfamiliar to 99 per cent. of the users of the fruit, that it is strange

if there is not a twinge of conscience in the mind of every person applying that false name to one of the best citrus fruits the world has ever seen—and the one which has made the most money for its growers, with the exception of the orange, perhaps, since the two species left their ancient home in India and the Far East.

Chico.—This excellent Tropical American fruit has traveled under several names, such as "naseberry," "sapodilla," "chico zapote," and others; but since it is not a berry nor any kind of a zapote, let us adopt the convenient little name which even Mrs. Grundy should have no difficulty with—except that it sounds "foreign" and therefore *might* have a meaning (sic) less nice than its flavor.

Yautia.—This good old Arawak word originally meant "place of the Hutia," or so-called Spiny Rat of the Antilles. This tuber vegetable is supposed to be the very oldest crop cultivated by man; and we can imagine the savages of twenty thousand years ago being obliged to choose a word which would clearly signify that object which was always to be found in the places frequented by their common game animal, the now early extinct Hutia. This plant has been called "coco," "eddoes," "otó," and "macal" in various countries of Tropical America. Worse than having a number of names is the fact that the yautias were for many years confused even by botanists with the *taros* which belong to quite another genus of plants with *peltate* leaves instead of arrow-shaped.

It will be an interesting question to note whether it will be possible to accustom the Filipino planters to the use of the word before they get the idea settled in their minds that it is only a kind of "gabi"—which it resembles, of course, in habit.

Feijoa.—The name of this new fruit is to be spelled in English as in Latin but the Portuguese pronunciation (fay-zhó-a) is to be given it out of honor to Snr. Feijoa, a Brazilian gentleman, after whom it is named. This fruit will be very widely known, we believe, within a few years on account of its remarkably strong perfume and fine flavor, and now is the time to correct the spelling and pronunciation of the name.

Cherimoya.—This Central American fruit is now successfully introduced into the Philippines in the form of several varieties and even hybrids between *Anona cherimolia* and other species of *Anona*, and it is rapidly becoming very popular in California. It is also spelled Chirimoya, Cherimolia, and Cherimoyer, and, especially in California is often confused with the custardapple.

Custardapple.—This, not being an apple in either shape, size, color, or flavor, should either be written as one word, or better still a new word should be decided upon to take the place of the rather awkward and long name it now bears. The once fairly common West India name of "Bullock's Heart" has fortunately been dropped.

Sugarapple.—This also should be written as one word. It is also called Sweetsop in many British colonies. A new name is needed.

Mamon.—This fruit has also suffered under the names "Alligator Apple," "Monkey Apple," and "Pond Apple," but since it has nothing to do with any of the indicated objects it should be given a square deal.

Hevi.—This fruit has passed under the name of Otaheite (or Tahiti) Apple, or Vi, but the old Polynesian name used in its own home, so to speak, is much to be preferred. It is properly known to botanists as *Spondias cytherea* (*nec S. dulcis*).

Roselle.—This promising new vegetable-fruit came near being called "Jamaica Sorrel" a few years ago; the principal reason for such a name was the sour taste of the leaves and the so-called fruits. By the way, it has recently been misquoted, purposely or otherwise, as "Grosella," which is translated currant.

Baúno.—This new fruit in its very brief period of existence before the horticultural world has already been called Balun, Balona, Bayuno, and Bayono; but, there being little choice among these names, we should follow the native name mentioned in the original description by Mr. Robinson, of the Bureau of Science.

Papaya.—This word is probably Polynesian in origin and, therefore, of very easy pronunciation. It is not a "tree melon" and since another fruit (*Asimina triloba*), quite unrelated, is also called "Pawpaw" the latter word should be dropped as a synonym.

Cassava.—While there may be some reason for using the old Brazilian word "manioc," or "mandioca" for this crop, there is no good excuse for the Spanish-American "yuca," nor the fortunately rather rare British East Indian "tapioca." It is pardonable to sometimes use the commercial product when figuratively speaking of a raw material crop but we should no more speak of a "tapioca plantation" than of a flour field.

Soursop.—Unfortunately there seems to be no escape from using this objectionable name for a perfectly good fruit. It is known as "Araticú" in Brazil, as "Guanábano" in Spanish America, and "Guyabano," etc., in the Philippines, but since we are dealing with English words we must fall back upon soursop for *Anona muricata*.

Yambo.—This fruit certainly does smell like roses and taste as roses ought to taste, but it is not an apple in any sense of the word and, therefore, we should relinquish the beautiful but inappropriate name "roseapple." "Jamrosade" is also too much of a good thing; but yambo is the old name for this excellent fruit—which, we hope, will soon be much more popular here.

Mandarin.—Let us not use the word "tangerine" any longer. Tangiers, or as we should say, Tanger, is the adopted home of many good citrus fruits but it is hardly fair that we should accredit that city with the so-called "kid glove" type of oranges

(*Citrus nobilis*) which was quite recently brought out of southern China where mandarins have raised them for centuries.

Maize.—Out of deference to the Spanish "maïs" and our British neighbors who more or less correctly regard several other grains as corn, let us adhere firmly to the old (pre-Columbian Arawak "mahiz") correct name by which it is known practically everywhere outside of the United States; at this late date it would be useless to attempt to substitute the correct for the popular term there, but we are just in time here in the Philippines to start right.

OUTLINE OF AN EXAMINATION OF THE HORSE FOR SOUNDNESS.

(Lecture delivered at the San Francisco Veterinary College, 1818 Market street, San Francisco, California, by Prof. Charles Gresswell, M. R. G., V. S. L.)

If possible, see the horse in the stable before owner has a chance to "warm him up."

In the stable look for evidence of "crib-biting," "windsucking" and "night-kicking." Watch the animal for signs of "weaving." Notice the character of the excreta, to see if the grain is properly masticated, if there are any worms or bots, or for signs of urinary sediment, etc. Notice if there are any extra appliances in use for handling the animal—throat straps, or hobbles, etc.—or, if the animal for any reason is stabled alone, away from other horses, examine the manger to see if the food is all cleaned up, or if there are evidences of his eating the bedding. Look around the stable for proofs of medical treatment.

Then have the horse bridled or brought to the stable door with the halter on. Notice if there is any trouble during this attention. Have the horse brought quietly to the door, allowing no bustling or excitement. At the stable door examine the eyes carefully, using a black hat to cast the proper shadow over the eye. Look for any difference in the convexity of both eyes; examine the cornea for opacity or cloudiness, and the lens for cataract; notice the contraction of the pupils to determine the effects of light. Examine the eyes and breath for signs of opiates or other drugs. Listen to the heart. At this time give the horse a drink of water, and watch the process of drinking and swallowing. Have the horse then taken out of the stable into the open. Examine the nostrils for color, character or discharge, ulceration, abrasions, chancre and polypi. See that the orifice of the lachrymal duct is freely open. Examine the outside of the face for nasal gleet. Examine the ears for warts or any abnormal tenderness, and also for deafness. Examine the teeth and mouth, and smell the breath. Determine the age and make note of this, and also at this time of any distinguishing marks and color, and sex of the animal.

Examine the glands under the jaw and the glands in and around the throat, especially the parotid gland.

Examine the poll for poll evil.

Examine the neck for any signs of a strap having been used for wind-sucking; the jugular vein for evidence of having been bled. If this evidence exists, at once associate it with any other evidence which there may be of founder or of nervous or brain disease.

Examine the shoulders for fistula, sweeney and shoulder-joint concussion, or chronic sore shoulders from bad conformation.

Proceed down the fore legs and examine for any enlargement of the elbow joint or old scars denoting previous operation; the knees for enlargement or evidence of having fallen; the cannon bone for splints; the ligaments and tendons most carefully for any enlargements; the fetlock for sprain or bursal enlargements; the coronet for ringbone or sidebone; and then the foot for corns, quittor, founder, sandcrack, quarter-crack, seedy-toe, canker, thrush, contracted feet and navicular disease. Compare the size and shape of the feet and notice if shoes are of equal wear. Compare both fore limbs carefully for conformation, as well as for any enlargement.

Pass the hand over the back and loins to determine any irregularity in the bones of the spine or for any signs of abnormal tenderness of the skin or muscles.

Then proceed to examine the hind quarters and limbs. Compare both hips, standing behind and passing the hand over the hip joints. Look out for dropping of the hip bone. Examine the tail and notice if there is anything abnormal. Frequently a shiver can be detected by suddenly forcing the tail upward.

Examine the anus for signs of worms, at the same time the genital organs.

Examine next the stifle joints and compare one with the other.

The hocks must then be very carefully inspected for capped hock, curb, spavins of all kinds, thoroughpin, and for cracks or fissures of the skin in front of the joint.

Next examine the hind limbs for enlargements of ligaments or tendons, and the fetlock joints for bursal enlargements and thickening due to old sprain; the inside of the fetlock joints for what is commonly called brushing or interfering. Examine the pan of the heel for fissures, cracks and sores, constituting "scratches." Examine the feet for quittor, founder, thrush, sand-crack, quarter-crack, seedy-toe and canker. Compare inside of the hocks by standing in front and looking between the fore legs and also by standing behind and by feeling with both hands on and off and on the near side. After this general manipulation have the horse walked and trotted on level, soft and hard grounds, and also, if possible, on uneven ground. Have this repeated until you are quite satisfied there is no lameness or imperfect action such as stringent, etc. Back the horse, turn him sharply around to the

left and quickly back again to the right, in order to determine any chronic disease of spine or nervous system.

The next thing will be to have the horse saddled or harnessed or put to drawing heavy loads, depending upon the character of the horse and the business for which he is intended. Examine under these conditions for action and lameness.

The next in order is to examine carefully for wind, by galloping or driving hard up hill or by putting the animal to drawing a heavy load. In case of a young, unbroken horse, have him lunged by hand.

Examine for whistling, roaring or broken wind. Before doing this it is as well to cause the animal to cough and make a pretense of striking the animal with a stick, in order to bring out the characteristic grunt of roaring or the wheeze of broken wind.

After the examination of the wind, have the horse put back in the stable and remain perfectly quiet for fifteen to thirty minutes, if the patience of the owner will allow you that time. At any rate, allow the animal to get perfectly cool, and let it be brought out again and trotted up and down both with the rider and without. Together with other evidence, this will generally settle the question of the presence or not of navicular disease, and it will also bring out latent lameness in some cases of obscure bone spavin. It will, at the same time, test the permanency or not of cures of slight sprains. Take note of the general health and condition of the animal, and how it has stood the work given during the examination. If severe distress is noticed, coupled with an apparent high state of healthy conditions, look out for evidence of drugging, especially with strong alteratives, such as arsenic, very commonly used by unscrupulous dealers to produce an artificial appearance of good condition. After severe exercise, the evidence of arsenic will appear in a vivid red, and sometimes a blue, line along the gums, and also at times by severe diarrhoea, and abnormal thirst. The use of digitalis, in order to hide the incipient symptoms of broken wind will be detected both before and after exertion by an intermittent pulse. The use of cocaine, opium or morphine can be detected during the examination by the abnormal varying of the size of the pupil of the eye, and also occasionally by the breath after galloping.

The determinations as to whether any imperfection constitutes unsoundness must be governed by the purposes for which the animal is intended to be used.

TOBACCO CULTIVATION IN JAVA.

In the course of a paper on the cultivation of cigar tobacco, the *Imperial Institute Bulletin* has some interesting remarks with regard to soil and method of cultivation.

Not a little of the success of the Java industry is due to the peculiar character of the soil. The upper layers are chiefly made

up of very fine sand and clay, the result of the washing down of volcanic dust. The deposits are composed essentially of an andesite, a rock which usually contains from 5 to 1.34% of potash, so important an element in tobacco soils. An analysis of the volcanic ash shows that it is rich in lime (7.6%) and potash (2.1%) and moderately rich in phosphoric acid (.3).

In Java each piece of land is only cultivated every other year and is allowed to go under peasants' crops, usually rice, for the intervening period. As rice only occupies the land for about a hundred days, three crops are obtained between every two of tobacco. The distribution of crops is somewhat as follows: January to May, first rice crop; June to October, second rice crop; November to March, third rice crop; March to August, preparation for tobacco; August to December, tobacco crop.

The estimated yield of rice is given as 100 piculs (1 picul=136½ lbs.) per bouw (1¾ acres). This, taking 45 lbs. to the bushel, is at the rate of about 170 bushels per acre. The tobacco crop is given as 20 piculs per bouw, equivalent to 1554 lbs. or nearly 14 cwt. per acre.

These excellent yields, remarks the *Bulletin*, are due in the first place to the depth and richness of the soil, and also to the careful and thorough methods adopted by the Javanese peasants in preparing the soil. The rotation of the two crops may also have a specific influence.

The rice crop is not manured but the irrigation water is generally rich in organic matter of manurial value. Where the water supply is deficient for wet paddy, maize, soy, bean, groundnut, or dry rice is grown.

Water being of such importance in tobacco culture, the available supply is carefully conserved and utilized by means of reservoirs and channels.

VENERABLE FOREST MONARCHS.

The oldest living things in the world are the sequoia trees in the General Grant and Sequoia National Parks. The government has just issued a bulletin telling all about them and how to get to them. These trees are also the tallest trees known. Within the two parks there are 13 groves containing over 12,000 trees larger than 10 feet in diameter.

It is estimated that some of these trees were growing 4,000 years ago. In fact, annual wood rings have been counted on one of the fallen giants in the Sequoia park showing that it had reached that age.

The great pines of the Pacific coast, 400 and 500 years old, have reached old age, but the sequoia trees, several times as old as the great pines, are still in the bloom of youth.

They do not attain prize size or beauty before they are 1,500 years old, and are in their prime when 2,000 years old, not be-

coming old in less than 3,000 years. Not only do these trees stand in a class by themselves because of their long life, but they are classed among the wonders of the earth because of their giant size.

In the giant forest in Sequoia National Park, where the giants are named for men who have been prominent in public life, the General Sherman is 286 feet high and 36 feet in diameter, the Abraham Lincoln 270 feet high and 31 feet in diameter, and the tallest is the William McKinley, 291 feet high and 28 feet in diameter.

In the General Grant Park the principal trees are the General Grant, 264 feet high and 35 feet in diameter, and the George Washington, 255 feet high and 29 feet in diameter.

DIETIC VALUE OF SUGAR.

Professor Metchnikoff, the famous savant, speaking before the Academy of Sciences, stated that, as the result of long experiments, he had discovered that senility was caused to a great extent by poisons which were set up by the intestinal bacteria. These poisons, originating in the intestinal flora, were chiefly responsible for the production of lesions (injuries) in the liver, brain and arteries, and produced an effect which was practically the same as old age.

Experiments showed that vegetables which were rich in sugar, such as dates, beetroot and carrots, produced none of these poisons. Professor Metchnikoff's object, therefore, was to create a sugar-producing centre in the large bowel, where the fight between the healthy and unhealthy microbes takes place. As sugar consumed in the ordinary way is practically all absorbed before reaching the large bowel, he decided to form it by means of a microbe.

The necessary microbe was discovered in the flora of a dog. Experiments made on human beings with this microbe, which Professor Metchnikoff calls the glyco bacter, have had most conclusive results. A diet of two meals a day, consisting of 4¼ oz. of meat, 7¾ oz. of sour milk, and vegetables and fruit, to which were added glyco bacteria, reduced these intestinal poisons to a minimum which had never before been attained with any diet.—*London Produce Markets' Review*.

DRIED MANGO.

An observer in North Queensland thus describes a method of drying mangoes that is carried out successfully in that part of Australia. The description appears in the *Queensland Agricultural Journal* for February, 1912:

The mango is picked just before turning color. It is then cut up with a large knife in chips or small slices some 2 inches in

length, 1 inch or so wide, and perhaps $\frac{1}{2}$ inch thick. These slices are laid in the sun to dry, and become dry enough to store in three or four days. Sheets of galvanized iron (roofing) are used with sheets of paper laid on them. Cloth was not found satisfactory, and the paper could not be dispensed with, as the acid juice of the fruit turned the product a dark color if in direct contact with the iron. The fully dried chips are of a very pale-yellow or brownish-white color, and if only cut into similar shapes could hardly be distinguished in appearance from the best dried apples. These chips when thoroughly dry are stored in air-tight receptacles and may be packed quite tightly in them. The best receptacles are large earthenware jars. Hermetical sealing is very necessary and is generally done with ordinary beeswax.

When cooked, the dried fruit darkens in color a little and is not so decided in flavor as is the typical fresh mango—in fact, to one who did not know what it was, it looks somewhat like a mixture of dried apples and apricots. It makes excellent tarts and pies, and could equally well be used for jams or chutneys.

PESTS OF PESTS.

Two English physicians have discovered a germ which is fatal to flies and its propagation promises to rid the human race of the ubiquitous fly pest. The germ is easily grown on vegetable gelatin and when flies are inoculated with the germ and turned loose an epidemic disease is rapidly spread to other flies from which they die.

The germ in question is harmless to other forms of life, having a selective action on flies.

It is reported that the government bacteriologists in the United States are securing cultures from England with a view of starting a campaign against flies during the next summer season.

We hope this remedy will prove more practicable and widespread in its application than a highly recommended bedbug remedy the recipe of which was sold for a price.

The bug was first to be caught and made to laugh by tickling it under its chin, when the remedy was to be poured down the bug's throat, strangling it. The remedy was to be repeated until effective.—Mindanao (P. I.) Herald.

LOCUSTS DIE OF GERM DISEASE.

A discovery which promises much for the Philippine Islands is credited to a French physician, M. Felix d'Herelle, who has recently successfully fought a locust plague in Argentina. Two years ago Dr. d'Herelle while visiting Mexico noticed an epidemic among the locusts, and succeeded in isolating a bacillus which produced the disease. The Argentine government invited him to

make a test of his discovery there with the result that his first experiment was successful. Grass fields where locusts were feeding were inoculated by sprinkling cultures of the germs on the grass. Barriers confined locusts for observation and those that ate of the grass died in six days.

Infected locusts liberated rapidly spread the disease to other fields 30 miles away. Forty days later the epidemic had spread to locusts 250 miles away.

It is claimed that animals grazing on the infected grass were not injured.

From the fact that this epidemic disease of locusts was discovered in the tropics, it should be applicable here.—Mindanao (P. I.) Herald.

Proves Its Worth at Harvest Time

Crops must have Nitrogen, and the most available is that in

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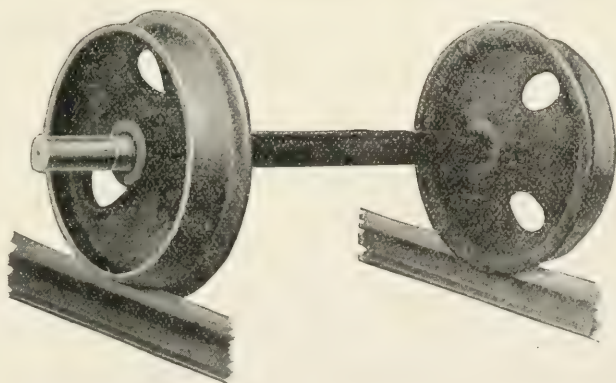
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Superintendent of Forestry.

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EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

JANUARY, 1913.

No. 1.

IMPORTANCE OF PROTECTING THE MILK SUPPLY.

In the annual report of the regents of the Smithsonian Institution, for the year ending June 30, 1911, there is an exceedingly interesting article entitled, "Profitable and Fruitless Lines of Endeavor in Public Health Work," by Edwin O. Jordan, Professor of Bacteriology, University of Chicago. In some points the article is as startling as anything that has come from Chicago professors—some of whose pronouncements in recent years have produced world thrills—for it sets forth opinions that must shock the ordinary sanitarian in regard to methods that have come to be deemed based on first principles of public hygiene. Professor Jordan attacks with the citation of authorities and evidence the expenditure of large proportions of health funds, as well as restrictive legislation, upon disinfection, the removal of garbage, plumbing inspection, etc. Even the house fly has a plea in abatement entered on his behalf, to the now almost universal indictment of being a disseminator of disease. Here is a specimen of Professor Jordan's iconoclastic criticism of modern sanitary methods, on a subject additional to those just mentioned:

"In the matter of heating and ventilation enormous sums have been spent and are being spent to renew the air in rooms and public assembly halls and to introduce pure air in what has been assumed to be necessary amounts. And yet if the work of Beu, Heymann, Paul, Erclentz, Flugge, Leonard Hill and others means anything, it demonstrates that the whole effect from bad air and crowded rooms is due to heat and moisture and not to carbon dioxide or to any poisonous excretions in expired air. When all the effects of crowd poison upon a group of individuals in an experimentally sealed chamber can be eliminated by rapidly whirling electric fans, it is useless any longer to look upon carbon dioxide as a measure of danger. If we recognize that all the discomfort from breathing air in a confined space is due to a disturbance of the thermal relations of the body, the problem of ventilation becomes very different from what has usually been supposed."

The matters above referred to are, however, somewhat foreign

to the scope of this magazine, but mention of them may add to the interest with which Professor Jordan's discussion of one of the most serious problems with which the division of animal industry is concerning itself will be perused—that is, the protection of the milk supply from danger to consumers. On this subject he says:

"The importance of control and supervision of the sources of public water supply has long been recognized, but the importance of controlling the quality of the public milk supply, although frequently urged by sanitarians, is not always appreciated. At the present time in the great majority of American cities it is safe to say that for every case of infectious disease due to drinking water ten cases are caused by infected milk. It is difficult to procure adequate funds for the sanitary control of the milk supply. By sanitary control of milk is meant not the upholding of a rigorous standard of butter fat and total solids, but the maintenance of proper standards of cleanliness and health for dairy cows and especially the safeguarding the milk from infection during collection and transportation. Under some conditions the protection of the consumer against milk-borne infection may be best brought about by compulsory pasteurization of that portion of the milk supply which can not otherwise be raised to proper standard. Whatever method of control be adopted, it is certain that any genuine improvement in the character of a milk supply will be followed in the long run by a lessening in the amount of typhoid fever, diphtheria, scarlet fever and, to some extent, tuberculosis. The early detection of a single case of typhoid fever or scarlet fever on a dairy farm may be the means not only of preventing an extensive epidemic, but of avoiding the formation of scores of new foci which can in turn serve to light up subsequent cases for many years. Proper pasteurization of milk has been followed in many cities, as in Glasgow, Liverpool and London, by an immediate and material reduction in the amount of typhoid fever. In other words, the connection between an expenditure of public money and a direct return in prevention of disease can be more clearly demonstrated in the case of milk supply control than in some other of the usual municipal health department activities.

"The question whether the quality of a city milk supply can be more favorably influenced by inspection and supervision at the source, or by generally enforced and controlled pasteurization, is one upon which there is still some difference of opinion among experts. There is little doubt, however, that simply as a matter of economy of administration much is to be said at present in favor of centralized pasteurization of a large portion of the supply. Viewed as a method for preventing a large number of cases of infectious disease at relatively small expenditure the pasteurization of milk certainly ranks high among effective health measures."

It may be stated that a large proportion of the milk supply of Honolulu is pasteurized by private corporate enterprise, making the problem here so much the lighter should public facilities for the process be resolved on. Pasteurization should not, by any means, be considered as a substitute for bovine tuberculosis control, in which great progress has been made on this island. As a measure of economic protection alone this campaign is justified, the same as exterminative and preventive methods against any disease of live stock.

In an article on insect pests of the New Zealand flax, by C. French, Jun., acting government entomologist, in the Journal of Agriculture of Victoria, December 10, the white mussel scale (*Phenacaspis eugeniae*) is said to be recorded from most parts of Australia, Ceylon, Japan and Hawaiian Islands.

The Philippine Review advocates the introduction into that archipelago of hippopotami for enlarging the meat supply. The lake region of the Agusan Valley, Mindanao, would seem to be eminently well adapted for the rearing of hippos, and the writer of the article is of the opinion that, if this entire region were made into a large reservation and stocked with these animals, it could be more profitably utilized in this than in any other way, thus supplying a large quantity of excellent meat in place of that which is now imported.

INDEX TO VOLUME IX.

With this number are presented the table of contents and index to Volume IX of the Hawaiian Forester and Agriculturist. The same method of indexing as was used for the preceding volume has been adopted. Reports of meetings of the Board of Agriculture and Forestry, annual and monthly reports of divisions, important articles on local interests and references to business concerns, government bodies, institutions, organizations, persons and publications are sub-indexed alphabetically. This keeps everything relating to one main topic together, probably enhancing the readiness of reference. The segregation of comparatively unimportant matters, such as names of persons mentioned and publications announced or quoted, makes the analyses of the important contents of the volume stand out in clearer relief than if scattered amidst the former data. At the same time the separation of names in their proper classes will show at a glance the wide range of the magazine's purview and sources of information and opinion upon matters within its jurisdiction. An instance of the value of an index to those who preserve their copies of the magazine was afforded by the present index before it was even sent to press. A departmental official had in preparation an important

document, in which he desired to mention the time of a certain event which had slipped his memory. Recourse to the typewritten copy of the index showed the thing wanted in an instant.

THE BLACK WITCH.

Discussing the character of the black witch (*Crotophaga ani*), an insect-eating bird, the Agricultural News makes some remarks that should be of interest here, where the question of the introduction of insectivorous birds has received much attention. What is quoted below will show that the care nowadays displayed by the Hawaiian authorities, as distinguished from the carelessness of former times, in deciding upon what birds may safely be introduced, is highly justified. Among other information and comment on the black witch, the Agricultural News gives the following:

"This bird is known by a number of common names, among which are the following: ani, black parrot, savannah blackbird, tick bird, black witch, keel bill, and (in St. Lucia) merle corbeau.

"The black witch is generally conceded to be a most useful bird on account of its insect-eating habits; its food includes many pests, and certain insects which are not generally eaten by birds. In Jamaica, the black witch has been observed eating stink bugs and cotton stainers: these are not often used as food by birds, on account of characteristic offensive odors possessed by them. Ticks also form part of the food of the black witch, and on account of its tick-feeding habits it is called the tick bird in certain localities. As an enemy of the insect pests of cotton, also, the bird is very useful.

"As in the case of all insectivorous birds, however, this one captures and devours beneficial insects, such as ladybirds and wasps, and it is probable that any beneficial as well as injurious insects are eaten as opportunity offers. In addition to ticks and insects, seeds and berries are also eaten.

"The question has recently been raised as to whether a useful purpose would be served by the introduction of the black witch into the island of Antigua. It would seem at first sight that the introduction of a bird whose feeding habits are known to be so useful could produce only beneficial results, but so many instances are known where the introduction of a species of bird or animal into a new locality has produced conditions other than those which were sought, that it is best carefully to consider whether there is another aspect of the question.

"The habit of destroying ticks, stinking plant bugs and cotton stainers is one which entitles its possessor to recognition, but the fact that beneficial insects are also destroyed should be taken into account. There seems to be no record of definite observations

which would lead to the forming of a conclusion as to the actual value of the black witch in the Lesser Antilles and the possibilities of its becoming a nuisance or even a pest in later years. Predaceous beetles (lady-birds) and wasps (Jack Spaniards) exert a considerable influence on the natural control of many insect pests, and the destruction of these forms of insect life might result in the increase of certain pests, especially the scale insects, which would not themselves be attacked by such a bird as the black witch."

It is said that the destruction of birds cost \$420,100,000. This is the sum placed by the conservation congress, due to the lack of birds sufficient to fight destructive insects. This is altogether too large an annual fee to pay for hat adornment and the gratification of thoughtless boys and men who care nothing for the great good birds do.—The farmer is the greater sufferer.—*Good Advertising*.

INCREASING DEMAND FOR CACAO.

The rapidly increasing demand for cacao is amply illustrated in the world's consumption of cacao which has increased from 122,526 tons in 1903 to 232,200 tons in 1911. In this connection it is interesting to know that Mexico, where the Europeans first found this "drink of the gods," as it was styled by Linné, has practically ceased to export cacao. Why does not the Philippines wake up to her opportunities as a cacao producer and exporter?—*Philippine Review*.

PROGRESS OF PORTO RICO.

The annual report of the Agricultural experiment station of Porto Rico has just been issued and contains many items of interest to the residents of the Philippines considering the situation of both these countries.

The trade of Porto Rico has increased from 33,200,000 pesos in 1900 to 157,400,000 pesos in 1911, of which 80,000,000 pesos are exports, all agricultural materials, raw or manufactured. Sugar is the leading export now. Tobacco and cigars to the value of 14,000,000 pesos were exported—other manufactured products were preserved fruits, straw hats, and distilled spirits. The advance of agri-horticultural science is shown by the importation of artificial fertilizers to the value of 2,000,000 pesos. Steam plows are largely utilized on the large sugar estates, and the cable plow is there favored in preference to the motor truck. Coffee in Porto Rico is a crop of considerable importance but pineapples and citrus fruits are now encroaching upon the coffee.

The growth of the fruit industry in Porto Rico during the last decade is remarkable. From nothing, the fruit export has during

the time grown to 3,600,000 pesos during the past fiscal year, yet the fruit orchards are just coming into bearing. Very superior pomelos and oranges are produced and aside from the fresh fruit shipped to the United States several pineapple canneries are in operation there.—*P. J. W., in Philippine Review.*

GOVERNMENTS HELP FARMERS.

In no other country in the world does the government lend aid to its farmers as does Denmark. The greatest energy is expended in securing the largest and most economical production of butter, bacon, and eggs. The most significant thing is that the greatest efforts are made to help the small farmer, with the result that the country is now almost wholly made up of small farms. One of the principal sources of aid is through furnishing farmers with cheap money. The government controls a series of banks. A laborer who has worked on a farm five years, and who has a character so good that two reputable farmers will certify to it, may obtain from one of these banks a loan corresponding to about 3164 pesos in Philippine currency. With this he may purchase a farm of from $1\frac{1}{2}$ to 5 hectares. The amount loaned by the bank covers probably nine-tenths of the value of the farm. Experts of the government visit every farm in Denmark every eighteen days and advise with the farmers as to the best methods of handling their business.

* * * *

A new departure in fostering an infant industry is the proposal of the governments of New South Wales and Victoria in Australia to establish vegetable and fruit-preserving factories in regions newly opened for colonization. These factories will be operated by the departments of agriculture of their respective states, the produce handled at a moderate rate, and if the settlers desire, the factories may later be acquired and operated under coöperative management.

The colonists will also be aided by the government in the production and specialization of the fruits that are best adapted to the regions under consideration and which make a superior canned product. This Australian enterprise might well serve as a good object lesson to the Philippines.—*P. J. W., in Philippine Review.*

COLLEGE OF TROPICAL AGRICULTURE.

University of the Philippines College of Agriculture,
LOS BANOS, October 22, 1912.

The Editor of the *Tropical Agriculturist*, Colombo, Ceylon.

Dear Sir:—I note in your issue of September, 1912, pages 225 and 256, some observations regarding the need of a tropical college of agriculture, and the statement that "Neither Great Britain nor the United States of America can be said to have a tropical department worthy of the name, attached to any of their agricultural colleges." This is probably literally true, as the Philippines are not, strictly speaking, a part of the United States, and the University of the Philippines is supported entirely from the revenues of the insular Government. There is, however, the College of Agriculture of this University operating under the American flag, thoroughly well established with some 280 students and more than three years of work to its credit. I believe that it accomplishes exactly the end you desire to be accomplished by a tropical college of agriculture, and that the instruction given in it covers sufficiently closely that which is desired in Ceylon and elsewhere in the tropics, so that students trained here would be found well trained for use in other tropical countries.

However, I do not, for a moment, think that the presence of a well equipped college in the Philippines which has already demonstrated that it can give a good education in tropical agriculture, is to be entertained as a reason for not establishing similar institutions in other tropical lands. On the other hand, the demand which has been shown here for instruction in tropical agriculture is the best possible reason for believing that similar institutions will succeed elsewhere. This college opened its doors in 1909, and during the first year had 55 students. The attendance was 95 the second year, 177 the third year, and is now, as already stated, more than 280. The demand for admission promises to be so great next year that the proposition of limiting the attendance seems to be seriously considered. There is such an industrial demand for the graduates that, except in the case of a few individuals who are educated under contract to enter the Government service, none of them have so far been willing to do so. I do not imagine that there is such a demand for agricultural education in Ceylon or in any other tropical British colony as there is in the Philippines, but the success which has attended the work of a college of agriculture here should certainly be a great encouragement to those interested in this project elsewhere.

Very respectfully,

E. B. COPELAND,
Dean, College of Agriculture.

NEW RUBBER-PRODUCING PLANT.

The following are a few particulars by the Chief of the Botanic Section of the "Secretaria del Fomento" in Mexico, printed in the *Bulletin of Agricultural Intelligence and of Plant Diseases* for September, 1912, regarding a new rubber plant. This tree, unlike others, grows in hilly country in dry and stony soils. It is called by the natives "Cacaloxochitl" and belongs to the genus *Plumeria* of the family *Apocynaceae*. All the known species of this family in Madagascar produce a latex-like juice; but *Plumeria rubra* is the only one known up to now as a producer of rubber in sufficient quantity to be worth extracting.

The trunk, from 6½-16 feet high, has a girth of from 8 to 24 inches; the bark is rough and of a light gray color; the leaves are opposite; the flowers are white and large and the root is used by the natives as a purgative. *Plumeria* is common in many regions of Mexico and Central America; it grows under the best conditions in sandy, stony and rocky soils on the mountains at a height of 1000 to 4000 feet, in dry regions where there is an average yearly rainfall between 30 and 50 inches.

The following composition was found on analyzing the coagulate of the latex:

| | |
|--------------------|-------|
| Resin | 21.9% |
| Moisture | 15.7% |
| Rubber | 25.5% |

This tree is easily reproduced by slips, and in the Botanical Station of Tezonapa, four weeks after a branch had been planted, new leaflets were observed. This plant is capable of producing a good quality of rubber. Investigations are being made, and from the experiments carried out at the Botanical Station of Tezonapa indications are already available as to the best method of tapping. The ordinary system of incision would not give good results. The young parts of the plant contain a quantity of rubber in excess of that of the trunk. Lopping off the heads of the plant is advisable and extraction must be made from branches thus pruned; this pruning improves the condition of the tree and increases the growth of the branches.

COTTON IN IMPERIAL VALLEY, CALIFORNIA.

EL CENTRO, January 25.—The cotton acreage of Imperial Valley for 1909-10, which was the first year that cotton was planted to any extent, was 350 acres, from which 175 bales were produced and sold at 14 cents a pound, or a total valuation of the crop excluding seed of \$12,250.

This satisfactory out-turn consequently led to an acreage the following season of 15,000 and a production of 6500 bales. This was also a high-priced year and the cotton was disposed of at 13.5 cents to 14 cents per pound, or a total valuation of \$446,875.

Not over 10,000 acres was harvested. In 1911-12, 12,000 acres were planted to cotton and 9600 bales produced and sold at an average price of 10.5 cents per pound, or a gross profit to the farmer of \$504,000.

On account of low prices only 8000 acres were planted in 1912-13, of which 1000 acres were abandoned which would leave actually 7000 acres, and to date 6200 bales have been ginned and a crop of 7000 bales is not an impossibility. The gross valuation for the season is \$437,500, with the average selling price at 12.5 cents.

So confident were planters over the returns of this season that Daly Bros. and Gage, the cotton buyers of the valley, estimate that 15,000 acres will be planted in Imperial Valley and 5000 acres in Lower California, which is under the same irrigation system as Imperial Valley.

There is a possibility that an acreage of over 100,000 could be planted both here and Mexico should the staple sell at anything over 12 cents during the coming year. There are over 500,000 acres suitable for cotton growing both in Imperial Valley and Lower California which is under the same irrigation system.

THE BUDDING OF THE MANGO IN ST. LUCIA.

In a recent issue of the *Agricultural News* an account was given of recent work on the budding of the avocado in Dominica.

Information has been lately received through the Agricultural Superintendent, St. Lucia, of similar investigations carried out by Mr. Archibald Brooks, Assistant Agricultural Superintendent, on the budding of the mango.

It appears that Mr. Niles, the Junior Instructor and Overseer at the Experiment Station, Union, was the first to achieve complete success in mango-budding; but a more general investigation of the subject on a larger scale, extending over the last eighteen months, is described by Mr. Brooks in his notes, which constitute the basis of the present article.

It is pointed out, first of all, that success in mango-budding mainly depends upon the vigorous condition of the stocks. For this reason the preliminary attempts to bud both mango and avocado stocks raised in bamboo pots proved unsuccessful. Flute and T-budding and splice grafting were tried, and it was endeavored to increase the vitality of the young stocks by the judicious application of sulphate of ammonia. Every attempt proved unsuccessful; the buds remained dormant for several weeks, and in some instances the avocado buds commenced to swell, but eventually turned black.

Having at the time a large bed of vigorous one-year-old seedling mango stocks, it was decided to attempt budding them by similar methods to those employed in the propagation of oranges. The inverted T method was tried first, and the attempt proved very successful; about 60 per cent. of the buds developed and produced good plants.

It is stated that this method has an advantage over the well-known patch budding of citrus plants in that the former does not demand such a high degree of skill and dexterity; for in patch budding it is, for instance, essential that the bud be cut so as to fit the incised area of the stock in order to make a perfectly tight union. In the case of the inverted T method it is only necessary that the bud be inserted beneath the bark and firmly tied in position.

The selection of bud-wood, it is pointed out, must be confined to young woody branches. The buds should be tied in position with raffia; budding tape should *not* be used, for mango and avocado stocks, being more sappy than citrus stocks, tend to favor fungi around the wound when covered with waxed tape. This was found to be one of the causes of previous failures already referred to.

A point which next received consideration was the transplanting of the budded stock. Some of the plants were lifted and potted in bamboo joints. The results show that this can be done successfully; but it is necessary to exercise great care, and only the largest bamboo pots should be employed. It has been found that plants with unusually long tap roots should not be potted, but transplanted direct in the field. Reducing to any great extent the length of the tap root, when potting, generally results in the death of the plant.

Other plants were transplanted in a similar way to that employed in citrus cultivation, and with the same satisfactory results. The plants were forked up and all the soil shaken from their roots. The leaves were clipped and the plants transplanted to permanent positions in the field.

In concluding his notes on this useful piece of investigation, Mr. Brooks points out the several practical disadvantages attend-

ing the usual method of mango propagation, namely, inarching; and finally, it is stated that experiments are now in progress having for their object the determination of the length of time that the plants will survive between lifting and their final transplanting. The results should provide useful facts in connection with the transportation of the budded plants over long distances.—*The Agricultural News*.

CARAVONICA COTTON.

By RUNAR OLSSON-SEFFER.

Cotton is the most important fiber that enters into the use of mankind today. It occupies more attention in the commercial world than any other product, and we hear on all sides of the great endeavors which are being made to increase its production in those countries which are growing it extensively, as well as to introduce it into new regions.

There seems to be no doubt, but that the consumption of cotton is increasing at a faster rate than its production. The world, therefore, now needs a new supply of cotton.

As it is generally accepted that a greater or less scarcity seriously threatens the cotton mills of this country on account of shortage of the raw material, having regard to the possible grave eventualities effected by the cotton pests in the Southern States, the introduction of a new variety should be encouraged.

ORIGIN.

This has been published several times, but we shall briefly draw the reader's attention to this for the benefit of those who have not as yet heard of the tree cotton.

Ten years ago, Dr. David Thomatis began growing cotton in tropical Australia, and in order to develop a variety suited to the local conditions, he experimented with various forms of cotton, until he succeeded in obtaining a very prolific variety, now known as Caravonica cotton. It is a hybrid produced by crossing kidney and sea island cottons. The former variety is indigenous of Mexico, and the latter originated on one of the tributaries of the Upper Amazon. The Mexican variety was chosen for its length, fineness and gloss, the Amazonian for its length and strength.

The name Caravonica was adapted from the town Caravonica, situated a few miles outside of Cairns, Queensland, where the cotton was discovered. The writer had last year, the pleasure of suggesting a suitable location for a Caravonica cotton colony in Mexico to Dr. Thomatis, who resides in the southern part of Mexico at present.

CHIEF ADVANTAGES.

Caravonica has a higher percentage of lint than is known in any other cotton, varying from 40 to 60 per cent.; a better form of tree, having no branches showing a tendency to trail on the ground; a large, freely opening boll, which allows easy and rapid picking; and, lastly, a heavy yielding capacity, which becomes more marked during the second and third year than during the first year.

Up to the present time only herbaceous cottons have been grown, which has to be replanted annually; the advantage of this variety can thus be readily seen, when a perennial bushy tree that grows to a good size can be substituted. Trees twenty feet high are common, but under cultivation the trees are pruned each year after cropping, and continue to yield profitably for from five to eight years.

CULTIVATION AND PLANTING.

The proper cultivation of Caravonica cotton is comparatively the same as for any other crop. The land should be plowed deep and close, breaking the surface thoroughly, and should then be cross harrowed to pulverize and smooth the surface. The rows are then marked off ten feet by ten feet apart, and the soil is bedded up by running a turning plow on each side of the row. One pound of Caravonica seed contains about two thousand grains and supplies enough to plant two acres at five hundred trees per acre.

The planting should be done at the end of May or in June, in order to be able to gather the cotton in the dry season in as good condition as possible. In less than two weeks, the plants are up, and when they are four to five inches high, they should be cultivated with the hoe, after which a plow is run on each side of the bed, throwing the earth on the plants.

If the seed is properly selected, only one seed is necessary in each hole, but many planters place from two to three seeds in each hole, and then, during the first harrowing, all but the thriftiest seedling is pulled out.

The Caravonica cotton, being a hybrid, shows a tendency to vary somewhat, as is the case with other hybrids. In order to avoid this, planting of cuttings has proved to be very effective in the eliminating of crossing. However, there is no danger of this with the first planting, and by obtaining seed from a different locality little variation will take place.

CLIMATE AND SOIL.

Cotton being a tropical plant is killed by frost, and its growth in colder climates is more or less stunted. Caravonica, however,

can be grown successfully in semi-tropical climates, that is, wherever sugar cane will grow. During the last few years, this cotton has been grown in the Hawaiian Islands, and the climate has proved to be admirably adapted to it.

The best soil for this particular cotton is loose, sandy loam permitting percolation of rain water and allowing underground water to rise by capillarity within reach of the roots of the plants. This will also allow heat and air to reach the roots more readily than dense clays.

ENEMIES.

Caravonica is very healthy and highly resistant to pests. This has been the experience in every country where it has been grown. A little before the rainy season, the trees should be well pruned and after cropping a severe pruning is useful in preventing the development of insect pests. This cotton seems for some reason to have less enemies than others and they appear less often and after the first year they are powerless to do great damage.

VARIETIES.

There are three varieties of Caravonica cotton. The first one is known as "wool," the second as "silk," and the third as "Caravonica kidney." The first one yields a very strong, rough, but regular fiber; the second produces silky and long staple with great strength; and the third or kidney variety is very similar to the sea island cotton, except that the plant is as large as the former and also being a perennial plant. The wool Caravonica derived its name on account of being serviceable for mixing with wool, while the silk variety was advantageously used with silk.

HARVESTING AND YIELD.

This cotton is easy to pick on account of the large size of the bolls, running about fifty to a pound. The bolls open well but hold the seed firmly, so that it does not easily blow off; and the crop lasts about five to six months.

Each tree ought to yield from eight to fourteen pounds of bolls of fifty or sixty per cent. lint, and Dr. Thomatis stated that his average yield has been from one thousand to one thousand two hundred of clean lint to the acre. The wool variety has yielded over sixty per cent., the silk variety fifty per cent., and the Caravonica kidney over forty-five per cent. lint. With three hundred or five hundred bolls each tree bears from four to seven pounds of seed cotton; and on the average one hundred ten bolls will give one pound lint and one pound seed. In Australia, Caravonica has yielded somewhat over one thousand two hundred pounds clean lint per acre, while the average in this country is about five hun-

dred pounds seed cotton to the acre. Unlike the Upland cotton, which possesses seed covered with short lint, and is white in appearance, Caravonica has clean black seed similar to the Egyptian, and is ginned by the roller gins, and not by means of saw gins.

CONCLUDING REMARKS.

To sum up, the high percentage of lint and its good length, combined with its drought-resisting qualities and the good form of the tree, highly recommend the Caravonica cotton as the future standby to the cotton growers in the Southern States.—*Review of Tropical Agriculture (Mexico)*.

A NEW GROUP OF FUNGI ON SCALE INSECTS.

In the *Annals of Botany*, Vol. XXV, No. XCIX, p. 842, there appears an interesting note by Petch entitled "Note on the Biology of the Genus *Septobasidium*." The writer points out that in this genus are included a fairly well defined group of Basidiomycetous fungi formerly classified under the genera *Thelephora*, *Corticium* and others related to these. The members of the group occur mainly in tropical countries and are found as a rule encrusting the living branches and leaves of plants up to a height of 10 feet or more from the ground. The variously-colored sheets of fungus often cover these parts for a distance of several feet, but they never kill them or cause any noticeable injury. The question therefore that naturally arises is upon what do these fungi live, since they do not appear to be parasitic on the plants on which they grow.

From an examination of a long series of specimens, Petch concludes that they are parasitic on scale insects, not, as in the case of the well-known local forms, on individuals, but upon whole colonies. This fact is of considerable interest from a local point of view, because at least two species of the genus *Septobasidium* occur fairly commonly in these islands. The first is one described under the name *Thelephora pedicellata*, in the *Agricultural Notes*, Vol. IX, p. 286. It is very common on lime trees in St. Lucia and forms violet-grey, waxy patches on their branches; the patches are often of considerable extent. In the description referred to it is stated that the presence of the fungus is often associated with the death of the parts affected; but it is also true that very frequently, as recent examinations have shown, the fungus may be present in large quantities without causing any apparent injury. The association of this fungus with scale insects that looked healthy is also recorded in the same place, but almost certainly the presence under the older parts of the fungus of numerous dead insects was overlooked. It appears, therefore, that this fungus

which is so universal in the island mentioned is not harmful but useful; and that when the parts of the trees upon which it is growing die, their death is due to some other cause, very possibly the harmful effect of the scale insects brought about before the fungus has had time to overcome them. Another species, almost certainly belonging to the same genus and having probably the same parasitic habit on scale insects, forms dark-brown sheets also on lime trees and covers colonies of scale insects in the same way as that first mentioned. It has been found in Antigua and Dominica, but has not yet been identified. It seems quite possible that one or two other species of the same kind may exist in the West Indies.—*The Agricultural News*.

THE MOST IMPORTANT THING.

(By MARK SULLIVAN in *Collier's Weekly*.)

There is no more important subject now pending before Congress and the country than the adoption of a definite and comprehensive water-power policy.—From the Annual Report of Walter L. Fisher, Secretary of the Interior, issued in December.

In my opinion, no question now before the Government is more important than the attainment of a proper solution of this question.—From the Annual Report of Henry L. Stimson, Secretary of War, issued in December.

Concerning no subject of legislation is there a more imperative need of a definite and comprehensive policy than in relation to the development and control of water power.—From a speech delivered by Theodore Burton, Senator from Ohio, on August 14, 1912.

* * * *

It takes pains, and art in the use of words, to make clear just why a water-power monopoly belongs in a wholly different class from any other kind of monopoly; and no amount of clearness in the use of words will accomplish it unless the reader has the imagination to see the relation which water power is going to bear to the civilization of the future. The most distinguished electrician in the United States, one of the few men whose unique qualities entitle them, in a literal and exact sense, to be described as geniuses, has said that a time is coming in this country when there will be no such thing as a *running* stream. He says that every drop of water will be stored in dams and reservoirs, and its fall toward the sea will be permitted to take place only at high dams where power will be generated for every form of labor in every household, not merely for running railroad trains and factories, but for cooking and ironing and the routine duties of homes. The man who has thus pointed out, in an extraordinary

detail of vision, just what water power is going to mean to future generations is Charles Proteus Steinmetz, and his office is consulting engineer of the General Electric Company, one of the very concerns most likely to be the great monopolist of water power if monopoly is going to be permitted. It is said that the General Electric Company controls about thirty-five per cent. of the water power so far developed in this country. The same thought has been expressed, though with less eloquence and breadth of vision, by a report of the Inland Waterways Commission:

"Wherever water is now or will hereafter become the chief source of power, the monopolization of electricity produced from running streams involves monopoly of power for the transportation of freight and passengers, for manufacturing, and for supplying light, heat, and other domestic, agricultural, and municipal necessities, to such an extent that *unless regulated it will entail monopolistic control of the daily life of our people in an unprecedented degree.*"

* * * *

TAFT'S VIEWS.

It is well known in Washington that Mr. Taft's persistently correct course in regard to the water-power question is due to two members of his Cabinet, Secretary Stimson of the War Department and Secretary Fisher of the Interior Department. These men take a thoroughly enlightened position: they want the water power developed; they want it developed by private capital; they want a sufficient reward held out to that capital, even including some possible speculative reward; *but they insist that enough power be retained in the Federal Government to prevent the amalgamation of all these power sites into one great monopoly, and also that there shall be opportunity from time to time to readjust the valuation of these sites.*

DIVISION OF ANIMAL INDUSTRY.

HONOLULU, January 8, 1913.

HON. W. M. GIFFARD, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I have the honor to report on the work of the Division of Animal Industry for the month ending December 31, 1912, as follows:

THE MILK ORDINANCE AND ITS ENACTMENT.

I beg to call the Board's attention to the fact that the municipal milk inspector, Mr. Joe Richards, has been retired from his position and another man appointed in his place. Mr. Richards has been delegated for the past two and one-half years to assist this

Division in the tuberculin testing of the dairy herds of the City and County of Honolulu, and to replace him with an absolutely inexperienced man would practically mean to put a stop to the co-operation of this Board with the Board of Supervisors, as it is beyond reason to expect us to begin to break in a new man to do work which it will require at least one year for him to become familiar with. The milk ordinance requires that the tuberculin testing of the herds belonging to the applicants for permits to sell milk shall be made without cost to the owner. This test has been assumed by the Board of Agriculture and Forestry on the condition that the Board of Supervisors provide an assistant, and so long as the work did not divert the time and attention of such an assistant from the supervision and inspection of the local dairies but on the contrary provided him with transportation to these places, it was decided that the official milk inspector be assigned to assist with the testing. This arrangement, which has saved the Board of Supervisors the cost of testing between 5000 to 6000 head of cattle annually, has proved immensely satisfactory, and it is but due Mr. Richards to state that the gratifying results are due to a large extent to his interest in and ability to do the work required of him. He has, as stated, given his whole time and attention to the work and has studied, not alone the conditions pertaining to it, but the character and idiosyncracies of each individual milk producer, with the satisfying result that the milk supply of the City and County of Honolulu may be said to be one hundred per cent. better than what it was two years ago. To drop Mr. Richards now and replace him with an absolutely inexperienced man can certainly not be to the best interests of the service and must necessarily place an unwarranted amount of unnecessary work on the shoulders of the officers of this Division who will have to train and educate him to do Mr. Richards' work.

I would therefore respectfully suggest that your honorable Board make such representations to the Board of Supervisors as will insure the continued services of Mr. Richards at least so far as his assisting with the animal tuberculin test is concerned. This work, which, as stated, devolves upon this Board only by consent, and which, likewise, embraces the securing, injection, examination and either branding or ear-tagging of between 5000 and 6000 head of cattle, was begun today, for the fourth time, with the injection of about 175 head belonging to Mr. Isenberg. In view of the public announcement of the appointment of a successor to Mr. Richards I went along to see the work done, and I came to the conclusion that the technique of the intradermal injection as well as the subsequent tagging and branding is much facilitated by the assistance of an experienced man.

Mr. Richards will remain in office until the 15th inst., it being understood that the remaining week is to be devoted to the instruction of the new appointee in his future work. There being

in the neighborhood of one hundred dairies in the county, the status of each of which may be a matter of record, at least in so far as the present incumbent is concerned, it is easily seen that the accumulated experience of two and one-half years of observation of conditions and enforcement of an ordinance containing some two dozen specific stipulations, cannot be transferred in a week, however diligent and willing both sides to the transfer might be, and leaving entirely out of consideration the acquirement of proficiency as assistant to the tuberculin testing officer.

In conclusion I beg your pardon for having gone into this subject at such length, but I consider the milk problem and everything pertaining to it of the greatest importance, when it comes to the conservation of the health of the community, and I consequently trust that your honorable Board will assist me in retaining the services of Mr. Richards.

QUARANTINE STATION.

I have to call attention to the fact that the dog division of the Quarantine Station is full and that the arrival of a large number of troops in the near future may prove embarrassing in case they should be accompanied by the usual number of dogs. During the last month the eighteen kennels have accommodated at least twenty-one dogs and at times more, and so long as there seems to be no diminishing in the prevalence of rabies in the Coast States of the mainland there can be no excuse for abating our vigilance in regard to the introduction of this disease.

The digging habit has unfortunately spread among the present lot of dogs to such an extent that it has become necessary to keep nearly every one of the animals chained up constantly. Twice dogs have escaped, having dug under the footboards, but were fortunately apprehended before they got away. Unless some other method can be suggested, I believe it will become necessary to pave the enclosures or else to macadamize them in such a way as to prevent digging.

Portable reinforcements for a limited number of kennels must also be provided, as it is doubtful whether the present enclosures would retain a dog if it developed rabies. A visit to the station by the members of the Committee on Animal Industry is respectfully suggested.

THE ANNUAL REPORT.

The writing of the report for the past two years has occupied the principal part of my time during the past few weeks. Unfortunately work of many natures has crowded in upon the Division, as for instance the endemic at Mr. Lyman's place near Pupukea, Oahu, and which has caused the death of nine animals during the

past week or ten days, and which has required two visits so far. The fact that it is intended to announce in this biennial report a new and simple method for testing horse stock for glanders has necessitated the examination of hundreds of pamphlets and periodicals in order to be sure that the same is original. The report of the Deputy Territorial Veterinarian at Hilo has been received and the two other ones are expected to arrive shortly.

REPORTS AND CORRESPONDENCE.

The monthly report of the Assistant Territorial Veterinarian is appended herewith, together with copies of a number of letters written or received from the Deputies on the other Islands and pertaining especially to the extension of the tuberculosis control work to their districts.

Respectfully submitted,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

HONOLULU, Hawaii, January 9, 1913.

DR. V. A. NORGAARD, Chief Territorial Veterinarian, Honolulu,
T. H.

Sir:—I have the honor to submit the following report for the month of December, 1912:

Tuberculosis Control.

Thirty-nine cows, 12 heifers and 4 bulls constituting Mrs. Isenberg's dairy at Waialae were submitted to the intradermal tuberculin test with the result that one was condemned out of a total of 55 head. The condemned cow had been purchased from P. M. Pond some time previous and at the time of purchase had successfully passed the test. The animal was at once removed from the herd and sent to slaughter and the stall carefully disinfected. After a period of three or four months this herd should again be submitted to the test and should then show a clean record.

In my report for the month of November I made the statement that the cow condemned in the dairy of H. B. Brown came from the Swanzy ranch at Kualoa; this is an error due to confusing brand marks, and I take this opportunity to rectify it. The animal in question was purchased from a Chinaman who keeps a small herd at Kalae and was not purchased from Mr. Swanzy's ranch.

Intradermal Mallein Test.

This new and original method for the detection and diagnosis of glanders was applied to three mules consigned to the Quartermaster's Department and which had come from Seattle without test certificates. The injection was made in the side of the neck on the afternoon of December 19. Examination on the following afternoon revealed only very slight swellings which were practically painless. These animals were examined again on the 21st and allowed to proceed to Fort Shafter, as they had successfully passed the test and so proven to be free from infection.

A small mule owned by Mrs. H. Harrison arriving here December 24 on the S. S. *Wilhelmina* was subjected to the intradermal mallein test at the Quarantine Station. The injection was made December 27 at 8:30 A. M. When examined at 5:15 P. M. of the same day no swelling was observable. As there was no indication of a reaction the animal was passed as sound.

One of the main features of the intradermal method of testing is its rapid action; the hyper-sensitive tissues of an infected animal will begin to produce a characteristic reaction six to eight hours after injection, consequently an animal injected at seven or eight o'clock in the morning may be proven diseased or otherwise by evening.

Importations.

The following live stock has entered this Territory through the port of Honolulu during the last month:

December 5—S. S. *Zealandia*, Sydney: 2 English bulldogs, J. H. Kelley. These were two very superior animals, one brindle and one fawn colored, and will greatly add to the value of Mr. Kelley's kennel. Due to the fact that Mr. Kelley had applied for a permit to import these animals and to the fact that they were accompanied by proper certificates of health, they were allowed to enter this Territory free from quarantine restrictions.

December 4—Honolulan, San Francisco: 1 horse, H. Rawley; 20 mules, Hilo; 7 crates poultry; 1 crate guinea pigs, 1 crate hares, U. S. Experiment Station.

December 5—Transport Dix, Seattle: 54 horses, 6 mules, Quartermaster's Department; 1 dog, Lieut. Keiffer; 1 dog, Lieut. Rogers.

December 6—Mongolia, San Francisco: 1 white Spitz dog, Mrs. M. D. Gear.

December 9—Sierra, San Francisco: 1 dog, Mrs. W. Pullar; 17 crates poultry.

December 8—Lurline, San Francisco: 1 horse, Wm. Campbell; 16 crates poultry.

December 22—Missourian, San Francisco: 26 horses, C. Belina; 3 horses, Quartermaster's Department.

December 23—Sonoma, San Francisco: 4 crates poultry.

December 24—Wilhelmina, San Francisco: 26 crates poultry; 1 dog, Mrs. Jamie; 1 mule, Mrs. H. Harrison.

December 31—Honolulan, San Francisco: 3 horses, H. Hackfeld & Company; 26 mules, Volcano Stables; 1 horse, Rosenberg Tank Company; 1 dog, George Kaupena.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

HONOLULU, December 31, 1912.

HONORABLE BOARD OF COMMISSIONERS OF AGRICULTURE AND
FORESTRY, Honolulu, Hawaii.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of December, as follows:

During the month there arrived 44 vessels, of which 22 carried vegetable matter and one vessel carried sharp sand for concrete work. The usual careful inspection was made with the following results:

| | Lots. | Parcels. |
|--------------------------------|-------|----------|
| Passed as free from pests..... | 1,576 | 37,019 |
| Fumigated | 81 | 2,343 |
| Burned | 81 | 99 |
| Returned | 1 | 96 |

| | | |
|---------------------------|-------|--------|
| Total inspected | 1,739 | 39,557 |
|---------------------------|-------|--------|

The parcels were received through the following channels:

| | |
|---------------------|--------------|
| By mail | 145 |
| “ baggage | 156 |
| “ freight | 39,256 |
| | <hr/> 39,557 |

RICE SHIPMENTS.

During the month 26,192 bags of rice arrived from Japan which were found free from weevil and were passed.

PESTS INTERCEPTED.

Eighty packages of fruit and 14 packages of vegetables were found in the baggage of passengers and immigrants from the

Orient. These being prohibited, they were destroyed by burning.

One queen bee arrived from Texas and, finding it dead, we burned the package and contents.

In the soil around plants from Japan we found three distinct species of *Melolonthid* grubs, one being an *Anomala* species. This group of insects are exceedingly injurious to vegetation and are closely allied to the Japanese beetle.

On a shipment of pinetree twigs sent here from Japan for New Year decorations I found an *Aphis* (*Lachmus* species), a very common pest in Japan, and fumigated the shipment for a few hours before letting it go.

Three species of Ants (*Tetramorium guineense*), (Sydney); (*Monomorium pharaonis*) and a *Cremastogaster* species (Japan), were taken in soil and on vegetables during the month.

HILO INSPECTION.

Brother M. Newell reports the arrival of 6 vessels, 5 of which brought vegetable matter. In a letter he reports that the shipments received this month are the heaviest ever received at Hilo. There were 325 lots, consisting of 6908 packages. Fifty bags of potatoes were cleaned of soil before delivery, and three crates of celery were treated for the celery fungus.

INTER-ISLAND INSPECTION.

During the month of December 62 steamers were attended to and the following shipments were passed:

| | |
|-------------------------------------|-------------|
| Plants (mostly forestry trees)..... | 66 packages |
| Taro | 768 bags |
| Lily root | 34 packages |
| Vegetables | 8 " |

Total inspected and passed..... 876 packages

The following packages were refused shipment:

| | |
|--------------------------|-------------|
| Various fruits | 16 packages |
| Plants | 12 " |
| Vegetables | 1 package |

Total inspected and refused shipment 29 "

For several months reports have come to the office of the serious damage done to some of our native ferns, *Sadlerias* and others, by the attack of the Australian fern weevil (*Syagrus fulvitergus*), which was accidentally introduced here a number of years ago. This beetle is, unfortunately, already well established in the ferneries and on the mountains back of Honolulu. Brother

Matthias Newell had reported the pest in a fernery in Hilo several years ago, but we have heard nothing more about the matter since. Knowing about the serious damage that this beetle is now doing in the forests around Tantalus and other localities on this Island, and fearing that if established in ferneries at Hilo it would sooner or later escape into the open and get into the fern forests which are so essential for the conservation of rainfall, I submitted the question to the President of the Board of Agriculture and Forestry and suggested to him to allow me to send Mr. D. B. Kuhns, Assistant Inspector, to Hilo, to make a thorough investigation, to which he heartily agreed. The following is Mr. Kuhns' report:

HONOLULU, Hawaii, December 31, 1912.

MR. EDWARD M. EHRHORN, Supt, of Entomology, Board of Agriculture and Forestry, Honolulu, T. H.

Dear Sir:—According to your instructions to investigate the fern weevil, (*Syagrius fulviterus*, Pascoe), which was reported found at Hilo several years ago and which is now causing great damage to ferns on the mountains back of Honolulu, I left Honolulu December 21, arriving at Hilo on the morning of the 22nd. On arriving I lost no time getting in touch with Brother M. Newell, who had found this fern weevil in a greenhouse some years ago, so as to ascertain the exact locality and from there make my investigations. Brother Newell kindly offered to accompany me to the place where he first observed the pest, namely, on Reed's Island.

A careful search was made of the greenhouse in question and of all ferns in the yard, but there was no evidence whatever of the work of *Syagrius*. From here we visited five other places as well as the ferns along the banks of the Wailuku river.

The *Sadlerias* and *Cibotium* tree ferns, as well as *Aspidium* and the Boston ferns, were commonly found out of doors, while in the greenhouses the various species of Maidenhair were commonly found. The two first named are the most common outdoor food plants of the pest, whilst it is quite partial to Maidenhair in the greenhouses. Being unable to find the weevil on Reed's Island and adjacent regions, I determined to visit higher elevations which might possibly have become infested. Accordingly, on the 25th of December I visited Piihonua, making a careful search from Rainbow Falls to an elevation of 1500 feet.

Having made close observation of the work of the weevil on the leaf stems of *Sadleria* on Tantalus, I paid particular attention to the fronds of these ferns, but found only the young fronds to be damaged to some extent by a fungus disease and the dying fronds and heart of the fern riddled by the larvae of the *Tineid* moth, *Ercunitus*. There is no evidence, however, of *Ercunitus* injuring healthy plants. The *Curculionid* beetle, *Pseudolus*, is quite common in the dead stems of the tree ferns, but I failed to find

where it had molested living fronds. *Pulvinaria psidii*, a cottony scale insect, is found in some localities quite heavily infesting *Cibotiums*, and its presence was conspicuous by the black fungus which covers the fronds. None of these endemic insects are known to materially injure the ferns in question.

December 26. The day was spent inspecting greenhouses and yards in Puueo and the ferns along the streams to Wainaku. Conditions here were much the same as in the other localities visited.

December 27. Examined the ferns in Kaumana to an elevation of 1500 feet. Conditions here were exactly as in Piihonua.

December 28. Examined the ferns in yards, greenhouses, and along the Volcano Road through the Waiakea Plantation, finding all remarkably free from insect injury. Two greenhouses were quite badly infested with mealy bug (*Pseudococcus longispinus*), which attacks Maidenhair.

December 29. The ferns in the forest at Kaiwiki were examined up to an elevation of 2000 feet. The ferns in this district are in perfect condition, there being no evidence of injury by insect or fungus disease.

December 30. Made a trip to the forest on the low, flat plain in the direction of Leleiwi Point, a distance of about four miles from Hilo. The *Sadlerias* comprise the larger part of the fern forest and these were free from insect injury, an occasional patch of ferns being slightly damaged by fungus.

During my stay in Hilo I visited seven localities, besides inspecting the ferns and plants in 36 greenhouses and yards about Hilo, and am pleased to report that I found no evidence of the existence of the fern weevil (*Syagrus fulvitarisus*) in any of the places visited.

Indications point to the fact that Brother Matthias Newell, who discovered the infestation, acted wisely in submerging the infested plants in water, destroying the beetles as they came to the surface, thus preventing the weevils from obtaining a foothold.

The cultivated ferns were remarkably free from insect injury and disease. Only a few instances of injury to Maidenhair fern by mealy bug (*P. longispinus*) were noted.

In the wild ferns the only noticeable injury is caused by a fungus which attacks the young fronds of *Sadleria*, and when so diseased they become infested with the larvae of the *Tineid* moth, *Ereumitus*. *Pseudolus* is frequently found in the dead and decaying fronds of *Cibotium* and *Sadleria*. All of the smaller ferns are absolutely free from injury of any kind.

Respectfully submitted,

D. B. KUENS,
Assistant Inspector.

Mr. Kuhns is very well posted on the work of this weevil and it is gratifying to know that he was unable to find the pest in all the localities visited. No doubt Brother M. Newell did the very best thing when he destroyed the weevils he found on Reed's Island. The same method he then used has been used by many people in Honolulu who grow ferns in inclosures with usually very good results. Once this weevil escapes into the open forest, however, there is absolutely no hope of a check, and the damage to fern vegetation already noted on Oahu will have a great bearing on the forest cover and future water supply.

I believe that some action should be taken by the Board of Commissioners relative to the shipping or taking of ferns from Oahu to the other islands. The Board should also cause an investigation to be made of the general spread of the fern weevil throughout the Islands. Ferns have been taken to all of the other islands in the past, and if this pest has been introduced with the ferns we should know it. It might not be too late to check it as did Brother Newell at Hilo before it gets into the open forests which are so essential for the conservation of water. The damage done to the various ferns soon causes their death, and as much of our forest undergrowth consists of many varieties of ferns, there is every possibility that great damage to the forest cover will result if the beetle is introduced. Once the forest ground cover is destroyed, the water supply will be materially shortened because of the run-off. Where now the spongy undergrowth formed by ferns, mosses and other vegetation retains the heavy rains and allows them slowly to percolate into the soil and substrata, when destroyed, the heavy downpour will rush down the mountain sides into the ravines and gulches and thence into the ocean, taking with it much debris and soil. Such damage can now be noticed on the slopes of Tantalus. We have not been able to ascertain as yet how many of our native ferns are attacked by the weevil, and I believe that this should be studied as soon as possible, even if it should require a special man for the work.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

HONOLULU, January 8, 1913.

HON. W. M. GIFFARD, President, Board of Agriculture and Forestry, Honolulu, Hawaii.

Sir:—I have the honor to transmit herewith the report of the Forest Nurseryman covering the work of the Division of Forestry for the month of December, 1912.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

HONOLULU, December 31, 1912.

R. S. HOSMER, ESQ., Superintendent of Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

Dear Sir:—The following is a report of the principal work done during the month of December:

Nursery.

| | In Seed Boxes. | In Boxes Transplanted. | Pot-grown. | Total. |
|------------------|-------------------|---------------------------|--------------|--------------|
| Sold . . . . . | ..... | 600 | 63 | 663 |
| Gratis | 5,000 | 1,400 | 1,290 | 7,690 |
| | <u>5,000</u> | <u>2,000</u> | <u>1,353</u> | <u>8,353</u> |

Collections.

Collections on account of plants sold amounted to \$7.40.

Hilo Nursery.

Brother Matthias Newell, in a letter dated January 2, states that he has distributed from his Nursery in Hilo 1500 trees in transplant boxes since Arbor Day and the total for 1912 amounted to 12,490 trees, the largest number for any year since the Nursery was started.

Fire on Ridge, Ewa Side of Kalihi Valley.

At 3 P. M. on December 15, 1912, a brush fire was reported to be raging on the Ewa side of Kalihi Valley. The writer went

at once to it and with the aid of a gang of prisoners kindly sent by Sheriff William Henry and five firemen sent by Chief Thurston of the Fire Department, we succeeded in putting it out after about two hours' hard fighting. A special report on this fire under date of December 16 was handed to the President and Executive Officer.

Congressional Vegetable Seed.

Thirty-five mail bags containing about 10,000 packages of vegetable seed were received from Washington. About one-half, or 5000 packages, marked "V-4," contains corn, cucumber, lettuce, onion and radish. The other 5000 packages, marked "V-6," contain lettuce, muskmelon, onion, radish and tomato.

Plantation Companies and Other Corporations.

Under this head we have distributed 10,000 plants in seed boxes, 6250 in transplant boxes, ready to set out, and 100 pot-grown. We have not received any large orders during the month.

Experiment Garden, Makiki.

The two men have been transplanting seedlings, mixing and sterilizing soil and doing other routine work.

U. S. Experimental Planting, Nuuanu Valley.

The man has been hoeing and clearing away grass and weeds from the smaller trees, also transplanting trees from seed boxes to leaf pots.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

Proves Its Worth at Harvest Time

Crops must have Nitrogen, and the most available is that in

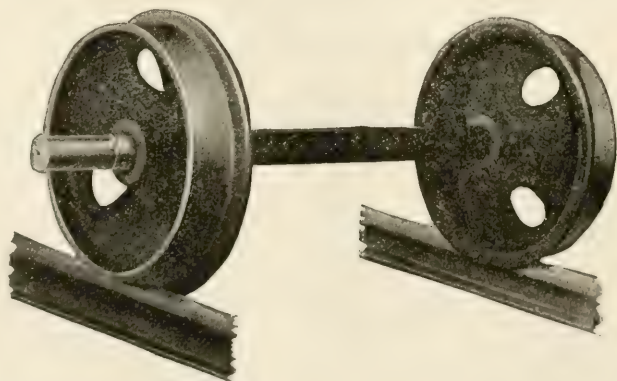
Nitrate of Soda

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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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FEBRUARY, 1913

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Hawaiian Forester

AND

Agriculturist

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OF

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

FEBRUARY, 1913.

No. 2.

Some idea of the damage and destruction of useful vegetation from which these islands are undoubtedly saved through the skill and the vigilance of the Division of Entomology, in keeping pests that are constantly being brought to the gateways of our commerce from entering, may be obtained from any of the monthly reports of the Territorial entomologist. Some notable instances will be found in the report of Mr. Ehrhorn for January in this number.

An article on starting right in the hog business, copied elsewhere from the Live Stock and Dairy Journal, is commended to small and large farmers in Hawaii.

As part of the aim of the Forester is to present suggestions for new agricultural products of commercial value, an article is reprinted in this number from Consular Reports on esparto grass for paper making.

An interesting article is given elsewhere on valuable forest trees of Chiloe Island, Chile, from Consular Reports. Several trees to which peculiarly valuable properties are attributed are briefly described. Mention may be made of the canelo, of beautiful foliage and yielding lumber immune from rats and vermin, also various trees with special merits for manufactures.

Through the kindness of Mr. Wilbur A. Anderson, manager of the Nahiku and the Hawaiian-American rubber companies operating on the Island of Maui, the Forester is enabled to present some preliminary information respecting the First Cotton, Fibre and Tropical Products Exhibition, also the Fourth International Rubber Conference, both of which are to be held in London in June of 1914. It is to be hoped that the organizations and individuals engaged in the diversified industries of Hawaii, as distinguished from the sugar industry, will come together and make arrangements for having such industries properly made known to the world in London. As Mr. Anderson said, in his reports to the stockholders of the rubber companies mentioned, a serious mistake was made in failing to take adequate advantage of the

rubber exhibition in New York last year. Mr. Anderson ably represented the islands on that occasion, but he was not backed as he should have been either by money, assistance or material. The Philippines were enabled to out-show Hawaii, while other rubber producing countries threw it into eclipse. It will be an oversight of the present Legislature greatly to be regretted if it does not provide something for a Hawaiian exhibit in London next year.

This number of the Forester has been delayed owing to causes beyond the control of the editor, the same as delayed the January number.

From the report of the Superintendent of Forestry in this number, it will be seen that the reforestation of these islands is advancing in great strides. The manner in which the sugar planters are taking up tree planting is particularly gratifying, their large resources enabling them to set an example of striking dimensions to smaller landholders. It is safe to say that the tree-planting in Hawaii during the past and the present decade will have created millions of dollars' worth of assets, while the preservation of old forests and the conservation of water, in the many forest reserves established, are of inestimable value.

Later official reports of the cattle distemper at Pupukea, Oahu, described by Dr. Case in his report elsewhere, indicates that it was not one of the contagious animal plagues, but was caused by poisonous growths eaten by the cattle when their pasturage was destroyed by drought.

HAWAII NOTIFIED OF LONDON EXHIBITION NEXT YEAR.

The following letter and enclosure of advertisement of the events mentioned are self-explanatory, but comments deemed fitting are made upon them elsewhere:

Exhibition Offices,
75 Chancery Lane (Holborn),
London, W. C., 2nd Jan., 1913.

Wilbur A. Anderson, Esq., Nahiku Rubber Co., Ltd., Nahiku,
Maui, Hawaiian Islands.

Sir:—I beg to advise you that the Fourth International Rubber and Allied Trades Exhibition will be held in London in June of 1914, and during the same time, but in a building adjoining, the First Cotton, Fibre and Tropical Products Exhibition will be held. This means that all countries will be able to exhibit the whole of their products.

During the Rubber Exhibition the Fourth International Rubber Conference will take place.

During the progress of the Cotton and Fibre Exhibition there will be an International Conference of Tropical Agriculturists, of which Professor Wyndham Dunstan, Director of the Imperial Institute, is President.

His Majesty King George V is Patron of the Exhibition; Sir Henry A. Blake, G. C. M. G., is President, and the Right Hon. Lord Elphinstone Vice-President.

I shall be glad if you will kindly join the Honorary Advisory Committee, which will be without responsibility or liability to yourself.

Trusting to receive a favourable reply, I am,

Yours truly,

A. STAINES MANDERS,
Organising Manager.

(*Enclosure.*)

First International Cotton, Fibre, Tropical Products and Allied Trades Exhibition. London, June, 1914.

OBJECTS.

To bring together the Raw Products in every form: Cotton, Fibre, and allied articles.

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International Conference of Producers, Manufacturers, etc., for the exchange of ideas, etc., on somewhat similar lines to the International Rubber Exhibition Congress.

Further particulars will be announced in due course.

A. STAINES MANDERS,
Organising Manager.

MISS D. FULTON,
Secretary.

Offices:—75 Chancery Lane, London, W. C.

THE BIENNIAL REPORT.

(From the Pacific Commercial Advertiser.)

There has just come from the press the biennial report of the Board of Commissioners of Agriculture and Forestry for 1911 and 1912. It is a book of 258 pages, illustrated by thirty-six full-page illustrations, and covers in detail the activities of the three divisions of the board during the past two years.

First is the report of the commissioners—Messrs. W. M. Giffard, H. M. von Holt, J. M. Dowsett, Albert Waterhouse and Arthur H. Rice. This gives, under the heading of each division, a brief review of the salient points in the work accomplished in entomology, forestry and animal industry, with a summary for each division of the especial needs for the future. The report of the commissioners, having been issued separately a short time ago, in advance of the full report, has already been reviewed in these columns, but it may be said here that in its twenty pages are summarized the facts set forth more at length by the several superintendents.

Following the report of the commissioners are tables showing expenditures and a paper presented by W. M. Giffard to the joint committee on forestry of the Hawaiian Sugar Planters' Association and the Board of Agriculture and Forestry, entitled "Some Observations on Hawaiian Forests and Forest Cover in Their Relation to Water Supply," a comprehensive statement of the underlying reasons why our local watersheds should be well protected.

DIVISION OF FORESTRY.

The section allotted to the Division of Forestry consists of reports by the superintendent of forestry, Ralph S. Hosmer; the forest nurseryman, David Haughts, and the consulting botanist, Prof. J. F. Rock.

Mr. Hosmer briefly outlines the reasons for practising forestry in Hawaii and argues for the better protection of the forests on the watersheds, especially through fencing, that they may be made more surely to produce their most important crop, water. During the past two years four new forest reserves were set apart in South Kona, and in Puna, Hawaii, on Molokai, and in Kula, Maui. There are now twenty-seven forest reserves in the Territory with a total area of 683,101 acres, of which sixty-seven per cent., 454,810 acres, is government land.

Passing to the second main line of forest work, the encouragement of tree planting, it is shown that in the past two years more seedling trees than ever before were distributed from the Division of Forestry nurseries at Honolulu and the sub-stations at Hilo,

Hawaii, and Homestead, Kauai, the totals being 620,739 for 1911, and 806,537 for 1912.

Tables follow showing the total number of trees reported planted by sugar plantation companies and other corporations throughout the Territory. For 1911 the figure is 1,134,940; for 1912, notwithstanding that it was a phenomenally dry year, 1,303,698. When these figures are compared with 1908, when 498,677 trees were reported set out, the increase of interest in tree planting in Hawaii is very apparent.

Some space is given to experimental forest planting and to plant introduction work, which it is recommended be given more attention.

FORESTRY NEEDS.

The needs of the Division of Forestry are summed up as follows:

The better protection of the native forests needed for watershed protection, essentially through fencing and the killing off of wild stock.

Better provision for getting seedling trees and plant material into the hands of those who want to do forest planting, through the establishment of additional sub-nurseries.

The extension of experimental planting with particular reference to the introduction of plants that will supplement the native forest of the wet districts.

The actual planting of areas of government land in various parts of the Territory.

The continuation and strengthening of the existing policies of the Division of Forestry regarding the protection of the forests from fire and the giving of advice and assistance to owners of forest land.

Mr. Haughs' report deals in detail with the work at the government nursery and the giving of advice and assistance to persons desiring to plant trees. It also has an account of the introduction and propagation of the basket willow, which gives promise of some day becoming the basis of a new local industry.

Mr. Rock, botanist, tells of finding new species of plants on the Island of Hawaii and gives further notes about the native Hawaiian rubber-producing tree that he discovered at Puuwaa-waa. The illustrations show typical forest scenes and the work being done at the Division of Forestry nurseries.

DIVISION OF ENTOMOLOGY.

E. M. Ehrhorn, superintendent of entomology, in the next section of the report, outlines succinctly the work of his division in keeping insect pests from gaining entrance to Hawaii. The importance of this work is manifest, and even to one unacquainted

with entomology the long list of insects intercepted (pp. 122-126) is an impressive showing of what the Islands have escaped.

At Honolulu and Hilo 991 vessels were boarded during the period, and plant or other vegetable matter was found on 556 of these. This shows an increase of eighty-eight vessels boarded and of seventy-two vessels bearing vegetable matter over the previous biennial period. During 1911 and 1912, there were inspected 204,059 and 280,930 packages respectively of fruits, vegetables and plants, making a total for the two years of 484,899 packages. As compared with the same period for 1909-1910, there was shown an increase of 97,928 packages inspected. Owing to the very rigid inspection by the entomological officials a very marked improvement in the quality of fruits and vegetables coming from the mainland has been noticeable.

The tables illustrating the inspection work bring home to one the large quantities of fruits and vegetables that are annually imported, and, incidentally, are an argument for the raising of more of these products locally.

Owing to the fact that Honolulu is the main port of entry for the Territory the importance of inter-island inspection is easily seen as an adjunct to the general horticultural inspection, because should ever any pest be accidentally introduced at Honolulu, its spread to the other islands can thus be more effectively guarded against, if not absolutely prevented. The thoroughness with which this can be done depends on the efficiency, and consequently on the extension, of the inter-island inspection. Recent rules having to do with this matter are reprinted for the better information of the public.

FRUIT FLY PARASITE.

In view of the recent discovery made in Africa by Dr. F. Silvestri, the entomologist employed by the Board of Agriculture and Forestry for this purpose, of a parasite for the Mediterranean fruit fly, the portion of the report dealing with fruit fly control will be read with greater interest. Not only has the control work reduced this serious pest, but even the casual observer will have no difficulty in noticing a direct improvement as to present conditions in general, in comparison with those existing two years ago.

This goes to show that a clean culture campaign, or the cleaning up of premises, it does not matter for what particular pest, means much to any community, and especially to Honolulu, where horticultural conditions are entirely different from those of the mainland. The let-alone policy that has been practiced here from time immemorial has seen its day, and the more intelligent classes now are beginning to realize that to enjoy the flower garden and the fruits of the few trees in their yards they must practice closer supervision and adopt more of Burbank's methods,

which many are now doing. The cleaning up of the banana fields, narrated on page 138, shows what clean culture methods have done for this particular industry. The same methods would be equally efficacious with other crops.

The steady increase of fruit and plant shipments arriving in Honolulu from the Orient and the Coast, added to the fact that the completion of the Panama Canal will bring the Territory into direct communication with Central and South America, as well as Mexico, makes it quite apparent that ample funds are necessary for the extension of the work of the Division of Entomology.

ANIMAL INDUSTRY.

The report of the Division of Animal Industry occupies ninety-odd pages of the report and treats in an interesting way the important subjects of the live stock industry of the Territory, bovine tuberculosis, glanders and the quarantining of dogs on account of the danger of rabies, as well as outlining the routine work of the division staff. The report is made jointly by Dr. Victor A. Norgaard, Territorial Veterinarian, and Dr. Leonard N. Case, Assistant Territorial Veterinarian.

Under the heading "Live Stock," facts and figures are presented showing the large number and fine quality of animals that are now being brought into the Territory each year for breeding purposes. For one example of the good accomplished, the average weight per carcass and the average price of meat per hundredweight received by the producer, has increased in the past three years, from 449 to 490 pounds, and from \$9.77 to \$9.96, a result in part of the introduction of better blood.

Another important fact in this connection is that the former practice of "stuffing" shipments to Hawaii with one or more worthless animals has practically disappeared. With the present strict inspection and quarantine it does not pay to use Hawaii as a dumping ground.

A number of illustrations show cattle, mules and horses imported by various ranches or individuals, particularly by the Parker ranch on Hawaii. These pictures alone make the report of interest, showing as they do how high a grade of stock is now being introduced.

Under the head of "Diseases of Live Stock," it is stated that "the past year has been practically devoid of any serious outbreaks of either infectious or contagious diseases among live stock, while parasitic diseases have continued to decrease with improved methods in handling and caring for the animals."

ONE STARTLING REASON.

The section on the control and eradication of bovine tuberculosis is one that ought to be read by the head of every household, for, as Dr. Norgaard says, when "more than twenty-five

per cent. of all cases of generalized tuberculosis among children under sixteen years are due to the bovine type of tubercle bacilli, it appears indefensible to allow a single tuberculous animal to remain in the Islands."

The record of the tuberculin testing of the dairy herds on Oahu, which resulted, through the destruction of affected animals, in reducing the percentage of disease from 31.26 per cent. at the first test to 5.39 per cent. at the third, is one of which the Territory may well be proud. It points the way to what ought now to be done in the other counties of the Territory, and also to the fact that having gone so far there must be no decrease in continued vigilance through efficient inspection; that alone is the price of liberty in animal industry as in the other affairs. To accomplish this, Dr. Norgaard repeats the recommendations of the milk commission of 1910, and the sanitary commission of 1911, that the control of milk be vested in the Territorial Board of Agriculture and Forestry, in order to secure protection for the entire Territory.

The chapter on the eradication of glanders is one full of interest, especially the almost dramatic account of the suppression of an outbreak of this disease in Waipio Valley, Hamakua, Hawaii, and the treatment of a suspicious case at Schofield Barracks. The reimbursement is advised of owners whose diseased animals have to be killed to insure the safety of the public.

Perhaps of greater scientific than popular interest is the description of the intradermal tests, with mallein and tuberculin, that having been perfected by the Division of Animal Industry, were successfully applied, respectively in investigations of glanders and tuberculosis. But these statements, with those concerning sheep and chicken diseases, give the report weight and character.

PROTECTION FROM RABIES.

The occurrence of rabies in California was the occasion, in 1911, for the passage of a regulation by the Board regarding the quarantine of dogs coming into the Territory. This subject is discussed at length, with a description of the dog quarantine station. There is also an account of a newly devised painless method of putting out of the way, by the use of gas, mangy dogs that it is found necessary to dispose of. Pictures illustrate the operation of the "lethal chamber," before and after.

Following that by Dr. Norgaard are reports from the deputy Territorial veterinarians, Dr. H. B. Elliot, Hilo; Dr. J. C. Fitzgerald, Maui, and Dr. A. R. Glaisyer, Kauai. Each takes up the subjects of diseases of live stock and the introduction and breeding of high-class animals. Attention will especially be attracted to this part of the report by the illustrations of thoroughbred horses recently imported into the Territory.

Altogether the report is the most interesting that has come from the Board of Agriculture and Forestry, showing as it clearly does the many directions in which this department of the Territorial government is being of practical service to the people of the Territory. A note on the cover, giving a list of the board's publications, says that this report, as well as the other printed matter put out by the board, will be sent free to any resident of the Territory upon request.

DIVISION OF FORESTRY.

The Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for January, 1913.

BIENNIAL REPORT.

During practically the whole of the month my own time has been taken up with the preparation of the biennial report of the Division of Forestry for the years 1911 and 1912, and in getting ready for presentation to the Legislature certain other data required by the Board in connection with forest work. This report of the division, now in the hands of the printer, sets forth in detail what has been accomplished during the past period, with a general statement of the reasons why the necessity for practical forestry must always remain one of the essential needs of this community. When printed the report will be available for general distribution.

PLANT DISTRIBUTION.

The report of the forest nurseryman shows that during this winter a large number of tree seedlings are being sent out to sugar plantation companies for forest planting. One corporation on Oahu alone has ordered half a million seedlings for delivery this winter. A part of this lot goes forward early in February.

In this connection it may be permissible to repeat from my biennial report the totals from a table showing the number of trees reported planted by corporations throughout the Territory during the past two years. For 1911 the figure is 1,134,940; for 1912, a little larger total, 1,303,698. Had it not been for the dry season the figure for 1912 would undoubtedly have been considerably larger than this. In 1908 a similar estimate totaled 498,677. These figures show conclusively that the arguments as to the value of tree planting have made an impression. As the years go by those who have planted stands of trees will have more and more reason to be glad that they did so.

CONGRESSIONAL VEGETABLE SEED.

Early in January there was received from Washington the usual consignment of Congressional vegetable and flower seed from the Delegate to Congress, Hon. J. K. Kalanianaʻole. Following the custom of former years, this seed is being given general free distribution through the schools, particularly those that are making a specialty of school garden work. But anyone who applies may obtain a packet of seeds, free, for his own use. The kinds available are lettuce, muskmelon, onion, radish, tomato, corn and cucumber.

The flower seeds are candytuft, calendula, kochia, mignonette, poppy, zinnia, nasturtium and dianthus.

The Delegate writes: "Perhaps you might advertise the fact that you have seed on hand for distribution, as I believe you have done in the past. The flower seeds, especially, I would like to reach those people who are interested in having their front yards looking nice." Application for seed should be addressed "Seed Clerk, Box 207, Honolulu, Hawaii."

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

FOREST NURSERYMAN'S REPORT.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is the report of the principal work done by the Forest Nurseryman for the month of January, 1913:

*Nursery.**Distribution of Plants.*

| | In seed boxes. | In boxes transplanted. | Pot Grown. | Total. |
|------------------|-------------------|---------------------------|---------------|------------|
| Sold . . . . . | ..... | ..... | 122 | 122 |
| Gratis | 2000 | 1050 | 883 | 3933 |
| | <hr/> 2000 | <hr/> 1050 | <hr/> 1005 | <hr/> 4055 |

Collections.

| | |
|--|----------------|
| Collections on account of plants sold amounted to..... | \$ 4.40 |
| Collections on sale of dead wood from Tantalus..... | 25.00 |
| Collections from Dr. E. A. Back for rent of building. | |
| Nursery grounds, from Oct. 16 to Dec. 31, 1912, at \$35 per month | 87.90 |
| Total | <hr/> \$116.90 |

Plantation Companies and Other Corporations.

An order for 5000 trees ready to be set out, to be delivered about the middle of March, has been received.

Distributed during the month:

| | |
|-----------------------------|--------|
| In seed boxes | 82,000 |
| In boxes transplanted | 1,000 |
| Total | 83,000 |

About 100,000 trees will be delivered during the month of February and the balance of this season's orders will be completed by the end of March.

Experimental Garden, Makiki.

Owing to the great demand for trees during the past few months, including the Arbor Day distribution, our stock has been very much reduced and we are busy both at Makiki and the main nursery trying to get a sufficient quantity ready to meet demands likely to come in.

U. S. Experimental Station, Nuuanu Valley.

The man has been doing the regular routine work. The weather has been dry during the month and no planting of trees could be attempted.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ENTOMOLOGY.

Honolulu, January 31, 1913.

Honorable Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of January, 1913, as follows:

During the month there arrived 43 vessels, of which 27 carried vegetable matter.

DISPOSAL.

| | Lots. | Parcels. |
|--------------------------------|-------|----------|
| Passed as free from pests..... | 863 | 23,959 |
| Fumigated | 13 | 219 |
| Burned | 67 | 104 |
| Total inspected | 943 | 24,282 |

Of these shipments, 24,045 packages came as freight, 172 packages as baggage and 65 packages in the mail.

RICE SHIPMENTS.

During the month 29,254 bags of rice arrived from Japan which were found free from weevil and other pests and were passed.

PESTS INTERCEPTED.

Sixty-five packages of fruit and 20 packages of vegetables were found in the baggage of the passengers and immigrants from the Orient, and this material was destroyed by burning.

Several small lots of orchids came from Manila which were infested with scale insects and ants. Six boxes of apples from California were destroyed on account of being infested with the codlin moth. A small shipment of gardenia florida from Japan was found badly infested with larvae of a wood-boring moth. This is the second shipment found thus infested and all the plants were destroyed in the garbage incinerator. In a plant shipment from Japan we found in the soil a number of larvae and pupae of a cicada or harvest fly. This is the first time cicadas have been found in plant shipments. The cicadas are very injurious insects in many countries. They include the well-known 17-year locust of the Eastern United States, about which so much has been written and which causes so much damage to farm and forest growth.

Two species of ants were found in soil around plants—*Lasius niger* from Japan, and *Monomorium pharaonis*, the common house ant, in soil from Manila.

Late in the afternoon of the 28th inst. the Makura arrived from Sydney via Suva, and just before sailing, late at night, one of the crew threw a crate of rotten bananas on the dock which belonged to a passenger going to Victoria, B. C. The crate and contents were taken to the incinerator early the next morning and burned. It is very fortunate that this fruit was not infested with maggots of the banana fruit fly, which would no doubt have crawled into the crevices of the dock.

HILO INSPECTION.

Brother Matthias Newell reports the arrival at Hilo of six vessels, five of which brought vegetable matter consisting of 157 lots and 3249 packages. Six crates of celery had to be cleaned from adhering soil. One sailing vessel brought 500 tons of clean and dredged sand from San Diego bay, California, and consigned to the Hilo Railroad.

INTER-ISLAND INSPECTION.

During the month of December 62 steamers were attended to and the following shipments were passed:

| | | |
|----------------------|-----|----------|
| Plants | 66 | packages |
| Taro | 784 | bags |
| Lily root | 39 | packages |
| Vegetables | 9 | " |
| Fruit | 1 | package |

Total passed after inspection. 899 packages

The following packages were refused shipment:

| | | |
|---------------------|----|--------------------------------------|
| Plants | 12 | packages rejected on account of soil |
| Lily root | 6 | " " " " " " |
| Fruit | 15 | " prohibited |

Total. 33 packages refused shipment

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, January 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, and Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit the following report for the month of January, 1913:

TUBERCULOSIS CONTROL.

The work in this direction, which was temporarily suspended that sufficient time might be given to the writing of the annual report, has now been resumed, and the fourth annual test of the dairy herds of the city and county has commenced. The dairies so far submitted to the test are as follows:

| | T. | P. | C. |
|--------------------------------|-----|-----|----|
| Waialae: | | | |
| Milking herd | 190 | 169 | 21 |
| Common herd | 225 | 184 | 41 |
| Mrs. Isenberg's herd | 55 | 54 | 1 |
| Carl Waldemeyer | 4 | 4 | 0 |
| Charles Lucas | 2 | 2 | 0 |
| (New cows added to the herd.) | | | |

There still remains above ten per cent., actual figures 13.19%, of tuberculosis in the Waialae herd. In the past three years the proportion has been reduced from seventy-five per cent. to the present figures, 13.19%. That it has not been reduced to a still lower percentage is due entirely to the fact that we have been unable to apply the test each time to the *entire* herd. In that portion of the herd which remained untested each time there were a few, one or more animals, which were infected and which passed the previous test due to the fact that the disease was still in its incubation. These animals, now that the disease has become advanced, become a grave source of danger, and are the ones which infect the others, spread the disease and keep up the percentage of diseased animals. To cut this percentage down and to eliminate the possibility of any animal remaining to spread the disease, frequent tests of the entire herd should be made. On April next every animal connected with the Waialae herd should be submitted to the test.

INTRADERMAL MALLEIN TEST.

On the 13th, at the request of Dr. Vans Agnew, Dr. Norgaard and myself proceeded to the military post at Schofield Barracks for the purpose of applying the intradermal mallein test to twenty-six officers' mounts which were to be shipped to the mainland. The object was in the main a demonstration to the post veterinarians of the technique of this new method of mallein testing. The demonstration was a decided success and all of the animals subjected were passed. Dr. Vans Agnew, while fully realizing the great care necessary in making the injections, was very favorably impressed by the simplicity and accuracy of this method, which reduces time and labor to a minimum.

FORAGE POISONING AT PUPUKA.

In the early part of the month Mr. F. S. Lyman called at this office and reported the loss of a considerable number of his cattle, both young and matured animals, from some undetermined cause. He stated that there had been a continual drought for some time, and green feed was very scarce. He had recently cleared a large tract of land from lantana and had turned his stock in there, when they suddenly commenced dying in alarming numbers. Death occurred suddenly with few premonitory symptoms. The symptoms which he was able to observe were loss of appetite, decreased flow of milk, lack of coördination of certain muscles, staggering gait and a more or less sanguinous discharge from nose and anus, following which the animal died in a few hours.

Acting upon this report Dr. Norgaard and myself proceeded at once to Mr. Lyman's place at Pamalu, with all the necessary paraphernalia for microscopical examination. Post mortem ex-

amination was held on one animal which had died the night before, the results of which are as follows:

The animal, a cow, was found to be in good flesh. Upon removing the skin no hemorrhagic, subcutaneous extravasations were found; liver slightly enlarged with evidences of some fatty degeneration, and numerous scars from fluke although no parasites were found; kidneys showing some congestion in both cortex and medulla; considerable enteritis and some enlargement of Peyer's patches, the contents of the intestines being considerably blood-stained; spleen considerably enlarged, being four to five times the normal size, dark red in color with a very soft, almost fluid, pulp almost black in color; heart and lungs normal; blood normal. The first, second and third stomachs were found filled with a large amount of a certain weed which was found growing abundantly in the pasture and also a considerable amount of leaves from the kukui tree. Numerous inflammatory submucous patches were observed in all three stomachs and must be attributed to the action of the weed. The fourth or true stomach contained a certain amount of fluid material and appeared to be in every way in a normal condition.

Microscopical examinations from the spleen, intestinal contents and blood revealed putrefactive organisms only. The suspicions of anthrax were thereby allayed.

Working upon the theory that the trouble was due to some poisonous weed, a thorough investigation of the pasture was made and samples taken of the weed which was growing abundantly over the field and with which the paunch of the animal was filled. This weed was the only green thing growing in the pasture with the one exception of the leaves of the kukui tree. The samples collected were submitted to Mr. J. F. Rock, botanist at the College of Hawaii, for classification. Mr. Rock classified the plant as the *Asclepias curassavica* L., the nuumela of the natives belonging to the family Asclepiadaceae. This species is known to be very poisonous, and has been the cause of considerable cattle poisoning in Australia.

This weed grows abundantly in many of the valleys, springing up quickly after a little rain, but as a rule cattle do not eat it unless forced to do so through the absence of other feed. That they were forced to eat large quantities of it in this instance was apparent from the condition of the pasture, which was entirely bare of grass and afforded nothing else of an edible nature. Therefore our conclusions in the matter were that the cattle were dying from the poisonous effects of these weeds. In an attempt to verify our conclusions we had a couple of bags of this weed forwarded to us with the intention of carrying on a few feeding experiments and noting the results, but so far we have been unsuccessful in our attempts to force the animal at the station to eat any of it. Since our last visit Mr. Lyman has not reported any more deaths.

IMPORTATIONS.

The following number of vessels entering this port were boarded and the following live stock was inspected, passed and admitted to the Territory.

Twenty-two vessels were boarded, of which number eight were found carrying live stock, as follows:

January 14, U. S. A. T. Sheridan, San Francisco:

1 dog, Lieut. Thatcher.

1 racoon, 25th Infantry.

January 14, S. S. Lurline, San Francisco:

3 horses, Q. M. Department.

1 horse, J. D. McVeigh.

1 cat, W. F. X. Co.

1 dog, C. Breand.

1 dog, E. L. Kelley.

3 dogs, Col. Kennon.

2 dogs, Capt. Norris.

8 crates poultry.

January 15, S. S. Siberia, San Francisco:

1 dog, H. B. Post.

January 20, S. S. Ventura, San Francisco:

1 crate ducks, W. F. X. Co.

January 21, S. S. Wilhelmina, San Francisco:

1 dog, Mrs. E. Behr.

18 crates poultry.

January 26, S. S. Arizonan, Seattle:

2 horses, Q. M. Department.

18 mules, Schumann.

January 28, S. S. Mongolia, Orient:

2 crates ducks, Japanese.

January 28, S. S. Honolulan, San Francisco:

2 dogs, V. R. Isenberg.

26 crates poultry.

4 shorthorn bulls, Hawn. Commercial & Sugar Co.

Very respectfully,

L. N. CASE,

Assistant Territorial Veterinarian.

HOW TO START RIGHT IN THE HOG BUSINESS.

(From *The Live Stock and Dairy Journal*.)

The essential principles for starting with hogs in Colorado and in California are so identical that the following advice given by C. W. Henry, a successful breeder, to the readers of the *Colorado Dairymen* will interest many of our readers:

There is no line of the live stock business one can get into with so small an outlay of capital as hogs, and the first cost of pure-breds is so small, considering the advantages gained, between those and just common stock that no one should hesitate in deciding which to take.

In the matter of equipment all one needs in Colorado is plenty of good alfalfa pasture. Several smaller pastures are better than one large one, as the hogs can be changed from one to another while the one is being irrigated, thus insuring abundance of fresh, tender alfalfa at all times. For shelter I have never found anything to compare with the A-shaped "Lovejoy" individual houses. One great advantage of these is that they can be built as one's business grows, and you don't have to have a lot of money at the start. They will cost around \$10 each, and any one used to using tools on a farm can build them. They are made of drop siding, 2x4s and inch boards for the floor. They are sanitary, and even in the coldest weather are amply warm. I know of a man who built a very expensive concrete hog house, concrete troughs, walls, floors and everything in the most expensive manner, and I don't believe this hog house will ever be as satisfactory as the "Lovejoy" individual, and the cost was ten times as great. These houses can be put on skids and moved anywhere, are always dry and no better farrowing pen could be desired. If a man is starting with only one or two sows he can build a couple of houses, and as his herd increases build more as they are wanted.

The pastures and houses are about all one needs in the way of equipment to start. There could be added such things as a cooler or steamer so that warm feed can be supplied in zero weather. I believe it will always pay to give hogs warm feed in the winter. At least I never could stand to see my pigs fill up on ice-cold feed and then run shivering to shelter.

After the equipment, of course, come hogs, and here is where so many fail. If one is unfortunate and gets inferior stock he is apt to get discouraged at the outset. I believe without doubt that the quickest way to get started is to buy a bred gilt or sow or two and if their litters are raised one has quite a herd at the end of a year.

If I were starting again I would buy the very best bred sow or gilt bred to the best boar in the State, and in that way with

reasonable success with the pigs be at the top at the outset. Whereas, if only fair sows or gilts are bought it will take years of improvement to be where one would be at the end of the first year. I feel that even in Colorado one can sell the best, and usually at a pretty fair figure, but there are always plenty of the inferior kind going begging. If, however, the pigs do not sell readily for breeders one can always sell to the butcher, and at the top of the market, too. For the beginner I think it a good plan to save only a few of the very best for sale as breeders until one has established a reputation, and later on there will always be a market for surplus stock. I know I have sent hundreds of better pigs to the packers than many breeders sold in the East for high prices, as breeding stock. In fact, if any Eastern breeder has ever sent out here an outstanding individual, regardless of price, unless the buyer has been there and picked it out, I would like to hear of it. I never have seen one.

ESPARTO GRASS FOR PAPER MAKING.

(From *Daily Consular and Trade Reports.*)

[Consular Assistant Ripley Wilson, Almeria, Spain.]

Esparto grass ranks third among the exports from Almeria, and this city is the center of the industry in Spain. There are three firms engaged in preparing the grass for shipment, and these buy direct from the villagers who do the gathering and who bring the esparto in from the surrounding country.

At present esparto can be purchased as it comes in from the country for about 67 cents per 46 kilos (101½ pounds); but this grass can not be baled and shipped for paper-making purposes without first being carefully inspected and cleaned of roots and bits of earth and other foreign matter that the natives include in the rough bundles they make. This cleaning in the factories of Almeria is done entirely by women, who are paid according to the amount they look over. One rarely earns more than 35 cents a day. While cleaning the grass these women also sort the esparto into two grades, the first consisting of the full, heavy grass, and the second of the lighter and discolored stock. The first grade seldom yields under 55 per cent. pulp.

The facilities that are offered by the local railway make it very difficult at times to bring the grass in from the outlying districts, and the trouble encountered during certain seasons of the year in getting ships for transport make the business an uncertain one. The fact, as stated in other consular reports, that the esparto root is often picked with the grass is true in this district also, and much damage is being done each year.

At various times the construction of a pulp factory in Almeria

has been considered, but largely on account of the great difficulty in obtaining water, a plentiful supply of which is needed in pulp making, the factory has not materialized. The bulk of esparto exported from this city is sent to Great Britain.

[Consul Rufus Fleming, Edinburgh, Scotland.]

SCOTCH PAPER MAKERS USE ESPARTO EXTENSIVELY.

Paper mills in this district, producing about 1500 tons per week, 1000 tons being writing and printing paper, use large quantities of esparto, both Spanish and African. Almost three times as much esparto (in weight) is imported into the district as of rags and wood pulp combined. It is imported in hydraulically compressed bales, of uniform weight and size, approximately seven bales to the ton (2240 pounds). From Spanish esparto the yield of paper is 55 per cent.; from African, about 50 per cent.; and from rags, 90 per cent. News print is largely made from mechanical wood pulp, with the addition of a small proportion of common rags.

Most of the mills in east Scotland have contracted for their supplies of first-quality Algerian esparto over 1913 on the basis of £3 9s. (\$16.79) per ton, free on rail at Edinburgh. Prices advanced somewhat last fall, and sales were made to English ports for shipment in 1913 at £3 12s. 6d. (\$17.64) free on rail. Tunisian esparto is scarce. As a rule, shippers of this variety sell Tripoli or (and) Tunisian esparto, and the cessation of supplies from Tripoli caused a run on Tunisian, and has indeed affected the price of all African esparto. Tunisian and Tripoli usually sell about 5s. (\$1.21) to 3s. 6d. (85 cents) per ton below Algerian, but there has lately been practically no difference. For best Spanish esparto the average contract price for 1913 has been about £4 15s. (\$23.11) free on rail at Edinburgh. This article appears to be short, and if further quantities were required it is probable that a considerably higher price would have to be paid.

Wholesale prices of esparto papers in this market range from 4½ cents to 6½ cents per pound, according to quality.

VALUABLE FOREST TREES OF CHILOE ISLAND.

(From *Daily Consular and Trade Reports*.)

[Consul Alfred A. Winslow, Valparaiso, Chile.]

According to lately published reports on the forest lands of Chiloe Island, situated off the coast of Chile, between 41° and 43° south latitude, many kinds of valuable trees and shrubs are found awaiting capital and labor to open up important industries in that part of the country. This island contains 2450 square miles and is covered with dense forests, except for a narrow strip along the west coast. The names, with a short description, of the more useful trees and shrubs are as follows:

Cypress (*Libocedrus tetragona*).—It is not known whether there are great quantities on the main island or not, but the tree abounds in the neighboring archipelago. It is a white timber, with a slight pinkish tint, resinous, and elastic. Its duration is such in all weather and atmospheric conditions that it is said to be almost indestructible. This and the alerce command the highest prices.

Alerce (*Fitzroya patagonica*).—About the same as the cypress, of great duration, fibrous, red, and light. It is said that these trees are found in almost all parts of the island. The wood is used for ceilings of houses and lasts for 50 years and more.

Manui (*Saxcegothea conspicua*).—A very abundant timber on the island of Chiloe; is very good for cabinetwork on account of soft and beautiful fiber. If exposed to the weather it lasts but a short time, and so is mostly used for flooring.

Ciruelillo (*Embothrium coccineum*).—This timber excels all others on the island for cabinetwork and can compete with the best imported into the country. Its tint is slightly pink, beautifully striped, and when properly polished has a metallic luster. The tree grows rapidly and is appropriate for park and garden ornamentation.

LAUREL GROWS IN ALL PARTS OF MOUNTAINS.

Laurel (*Laurelia serrata*).—There is not a point in the mountains of the island where this tree does not grow. It is the one most used and commands the lowest price. It is used for inside work, where it will not be subject to the changes of the weather.

Luma (*Myrtus luma*).—A very large tree abounding in the forests of Chiloe. Its lumber is red, very hard, and durable. It is used for the manufacture of carriage wheels and barrels.

Meli (*Myrtus meli*).—About the same as the luma, the only difference being in the color. It has the same properties and uses.

Muermo (*Eucryphia cordifolia*).—A very abundant tree on the island and grows to be very large. It is used in the foundation of buildings and for carriage making. It also produces good charcoal.

Tenio (*Weinmannia trichosperma*).—Large, abundant tree, with red timber. Uses same as muermo.

Avellano (*Gervina avellana*).—Similar to the ciruelillo in its fiber, although it has not the same pinkish tint. Its lumber is beautiful, but cracks and twists if exposed to the weather.

Tiaca (*Weinmannia paniculata*).—Flexible lumber very much used in the construction of boats, etc.

Radal (*Lomatia obliqua*).—Used in the manufacture of furniture; is of inferior quality to the ciruelillo.

Roble (Coigue) (*Nothofagus dombeysi*).—A very large tree of white lumber, soft and abundant in the island. Of short duration if exposed to the elements.

Tique (*Aextoxicon punctatum*).—Abounds only in the interior of the forest and is but little used as yet.

LUMBER IMMUNE FROM RATS AND VERMIN.

Canelo (*Drimys chilensis*).—This is a tree of beautiful foliage, which grows to great size and is very abundant in the island. Its timber is used for the interior of buildings. The lumber has the peculiarity of never being attacked by rats or vermin.

Arrayan (*Eugenia apiculata*).—This tree is characterized by having very red bark and being subject to changes every year. Hard lumber used in carriage construction.

Pelu (*Edwardsia macnabiana*).—A beautiful tree with a yellow flower and with very hard timber. It is not very abundant, except perhaps in the interior of the island.

El Tepu (*Tcpualia*).—A shrub which spreads horizontally on damp places, forming an impregnable barrier for man and beast. It is used as fuel and is noted for the heat it produces. It is burned in the sawmills of the island.

Quilineja (*Lazuriaga*).—Exported to Europe for the manufacture of baskets and brooms. This plant is a parasite and its roots adhere to the trunks of trees.

Quila (*Chusquea quila*).—A sort of bamboo and very abundant on the island. It is good food for cattle and supplies most of the forage for the stock raised on the island. It has been found to be rich in pulp suitable for the manufacture of paper.

THE EFFECT OF SOIL AERATION ON PLANT GROWTH.

C. Hunter, B.Sc., who has contributed an interesting paper to the *Proceedings of the University of Durham Philosophical Society* states that as a result of the various experiments which have been carried out with the object of investigating the connection between soil aeration and plant growth, it has been found that—

The circulation of the air in the soil affects the development of the root system and through that the development of the sub-aerial portions of a plant.

The production of artificial air currents in the soil appears to be beneficial to plant growth. This point is at present undergoing further investigation.

These experiments were undertaken at the suggestion of Professor Potter.

DESTRUCTION OF LANTANA.

This plant is apt to become a great nuisance in tropical countries on cultivated and pasture land, owing to its dense growth and extraordinary vitality. It appears from the *Journal d'Agriculture Tropicale* (1912, 12, 154) that an attempt is now being made in New Caledonia to combat the pest by introducing a species of fly of the Agromyzidae family from Hawaii. The insects have been distributed in the environs of Numea on land infested with lantana. As a result the larvae of the fly have been found in many of the seeds and it is intended to extend its distribution in the colony. The result of the experiment will be watched with interest; it must be borne in mind, however, that where a new animal species has been introduced to destroy some pest it has itself sometimes proved to be injurious in other directions.—*Imperial Institute Bulletin*.

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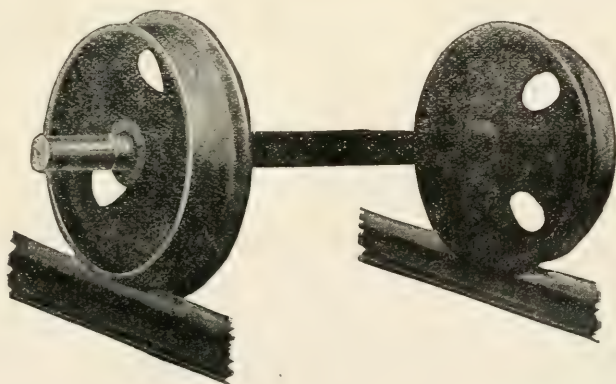
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DIVISION OF ENTOMOLOGY.

| | | |
|---|--------------------------------------|----------------------------|
| Edward M. Ehrhorn, <i>Superintendent of Entomology and Chief Plant Inspector.</i> | | |
| D. B. Kuhns, <i>Plant Inspector.</i> | | |
| Bro. M. Newell, <i>Fruit and Plant Inspector, Hilo, Hawaii.</i> | | |
| E. Madden, | } <i>Honorary Plant Inspector at</i> | { <i>Mahukona, Hawaii.</i> |
| W. O. Aiken, | | { <i>Kahului, Maui.</i> |
| W. D. McBryde, | | { <i>Koloa, Kauai.</i> |
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DIVISION OF ANIMAL INDUSTRY.

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L. N. Case, *Assistant Territorial Veterinarian.*
H. B. Elliot, *Deputy Territorial Veterinarian for Hawaii.*
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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
 Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
 * First Report of the Board of Commissioners of Agriculture and Forestry, from
 July 1, 1903, to December 31, 1904; 170 pp.
 Second Report of the Board of Commissioners of Agriculture and Forestry, for the
 year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
 Third Report of the Board of Commissioners of Agriculture and Forestry, for the
 year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
 Fourth Report of the Board of Commissioners of Agriculture and Forestry, for
 the calendar year ending December 31, 1907; 202 pp.; 7 plates.
 Fifth Report of the Board of Commissioners of Agriculture and Forestry, for
 the calendar year ending December 31, 1908; 218 pp.; 34 plates.
 Report of the Board of Commissioners of Agriculture and Forestry, for the biennial
 period ending December 31, 1910; 240 pp.; 45 plates.
 "Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
 "Digest of the Statute Relating to Importation, Soils, Plants, Fruits, Vegetables
 &c., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 18 plates.

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207 HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER and AGRICULTURIST

VOL. X.

MARCH, 1913.

No. 3.

Additional information will be found in the report of the Division of Animal Industry for February regarding the distemper at Pupukea, Oahu, to that furnished in the report for January. It would appear to be settled that the disease was produced by poisonous growths in the pasture. An interesting article appears elsewhere from an exchange on the influence of soil and climate on the edibility of certain plants, which would appear to have some bearing on the Pupukea incident.

Two chicken diseases that have appeared in the islands are described in the report of the assistant veterinarian for February.

An article on the Ceylon gooseberry in this number may have some interest for our homesteaders and suburban dwellers.

In his report for February the Territorial entomologist tells of some bad pests intercepted that month.

The Mindanao Herald, an exchange from which the Forester has frequently culled interesting matter, had its office destroyed in the conflagration that wiped out a large business section of Zamboanga, Mindanao, P. I., on Sunday night, February 2. It saved only a "baby" press, on which its issue of February 8 was printed. Fraternal sympathy is hereby extended to the paper.

The Hawaii Educational Review, "a monthly periodical devoted to the dissemination of educational thought and progress, particularly as adapted to the Territory of Hawaii," is welcomed among our exchanges.

President W. M. Giffard of the Board of Agriculture and Forestry, has received gratifying reports from Professor Silvestri, the eminent entomologist engaged by the board last year to seek a parasite for the Mediterranean fruit fly in Africa. The professor has succeeded so far that, at last accounts, he

was on his way from Capetown to Australia with colonies of such parasites, having discovered five varieties. In Australia he will endeavor to propagate fresh colonies to transport to Hawaii. Such ultimate success is eagerly hoped for here.

Is there room for the small farmer in Hawaii? For the twelve months ended December 31, 1912, Hawaii imported from the mainland animals to the value of \$343,994; breadstuffs, including animal feed, \$2,396,062; fruits and nuts, \$380,376; meat and dairy products, \$1,134,432; tobacco, manufactures of, \$772,027, and vegetables, \$369,755. These articles make a total of \$5,396,446, all of which might be supplied by Hawaiian farmers.

For the twelve months ended December 31, 1912, Hawaii shipped to the United States fruits and nuts to the value of \$3,528,236, of which \$3,329,097 was represented by canned pineapples. As an item of our exports that scarcely showed at all a few years ago, this exhibit is very encouraging. There are other things than pineapples which, backed by capital, intelligence and pluck, would equally reward enterprise.

In 1912 coffee to the amount of 1,785,920 pounds and valued at \$289,043 was shipped from Hawaii to the United States. The quantity in 1911 was 2,903,887 pounds and the value \$419,464. There will be a large crop this year. Figures of considerable exports of Hawaiian coffee to foreign countries are not at the moment available.

Exports of honey from Hawaii to the mainland in 1912 were of the value of \$51,256, against \$36,224 in 1911.

Shipments of raw wool from Hawaii to the States in 1912 amounted to \$51,422, against \$63,019 in 1911.

Exports of domestic products from Hawaii to foreign countries last year amounted to \$532,666, as compared with \$827,067 the year before.

EFFECTS OF GRASS ON FRUIT TREES.

An abstract of an account of classical research on the subject of the effects of grass on fruit trees is printed in the *Agricultural News* for March 15. The authorities quoted are the Duke of Bedford, K. G., F. R. S., and Spencer O. Pickering, M. A., F. R. S. The article says in part:

"The action of grass on fruit trees is often so deleterious that it arrests all growth, and even causes the death of the tree. The action is not noticed so much when the trees become grassed over gradually during the course of several years, for under these surroundings they can apparently adapt themselves to the altering conditions and suffer much less than when the grass is actually sown over their roots.

"It was thought some years ago that the action of the grass might be explained by its affecting the aeration of the soil by altering the amount of carbon-dioxide present, or by its effect on soil temperature, the moisture content or mechanical conditions. Any explanation on such grounds was found to be inadequate.

"It would not be possible in the space of this article even to refer to the various ingenious experiments that were conducted in order to obtain this negative generalization. It will be sufficient to proceed at once to the biological investigation of the question which commenced with an examination of the effect on fruit trees by heating soils—partial sterilization. Briefly, it was discovered that a toxic substance is produced by heating soils, which was found to be toxic toward the germination of seeds as well as toward the growth of plants, retarding the germination and reducing the percentage of seeds which germinate. After cultivation, however, the toxic substances become oxidized and the soil supports growth better than when not heated.

"Curiously enough, soil removed from grassed ground was slightly more favorable toward germination than the tilled soil, and it absorbed water much less readily than the neighboring tilled soil. This behavior provided negative evidence in favor of the production of toxic substances in grassed soils; and strong evidence of a positive character was obtained later, by causing washings, from grass growing in soils on trays, to reach the tree-roots with practically no exposure to the air.

"A deleterious effect was then produced nearly if not quite as great as when the grass was grown above the roots in the ordinary way."

MIGHT BE GOOD FOR HAWAII.

The Agricultural News advocates a herd book for the West Indies, and some of its arguments would appear to apply to Hawaii. A few passages from the article are here quoted:

"It is perhaps in connection with milk and meat production that benefit would be derived most quickly. It has already been pointed out that the characteristic feature of the animal industry in temperate countries is the clear line of demarcation between beef and dairy breeds. In the West Indies, apart from imported milch cows, there is no such clear distinction. Native milch cows are often used for working in the fields, and calves reared for killing or for labor may frequently have a common origin. It is true that the importance of a well bred bull is fully acknowledged in a general way, but sufficient recognition is not given to the importance of a bull of good milking strain in the breeding of dairy cows, and conversely to the importance of a cow possessing good 'beef' points in the raising of those animals which supply the community with meat. Moreover, there is the purely business aspect of the matter to be considered. It has been pointed out in connection with working cattle the form of an asset, but in the case of meat and milk production an increase in profits will show itself as surely in the West Indies as it has done in other parts of the world.

"One of the chief reasons for organization in these matters is the fact that the grazing of animals and milk supply is to a large extent in the hands of the peasants. If some system of registration were established the progeny of the best animals would in the long run take the place of those of the worst, and an additional advantage would arise in that a system of registration would tend to improve matters in regard to the prevalence of hereditary diseases.

"It may be put forward as an objection to any such organized scheme for selection that the climatic conditions and animal feeding in the tropics are unsuitable, that it would mean the continual importation of fresh stock and necessitate an alteration in the management of estates. But that would not be so. The object would be to select within the existing herds—not to select by means of the fortuitous crossing of worthless cows with imported bulls in a vain endeavor to raise West Indian cattle to the same standard that exists in countries which are eminently adapted for stock breeding. It is true that some improvement in feeding and management might be desirable and in this matter the agricultural societies would serve a useful purpose in the dissemination of information and in the provision of veterinary assistance. Further help could be rendered by the agricultural societies through an introduction of the score-card system of judging into the agricultural shows."

NEW METHOD OF PRESERVING MEAT.

A Belgian engineer has invented a machine which in all probability will diminish the importance of the present systems of cold storage in the preservation of large quantities of meat. The new method is described in the Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases for December, 1912.

In this it is stated that the invention is based on the fact that when the water that enters into the composition of meat is caused to evaporate, the organic liquids are concentrated to a point at which bacteria do not develop except with great difficulty. Moreover, during the process of evaporation the meat becomes coated with a film of gelatinous matter which protects the meat from further infection.

The loss of moisture is caused to take place by means of a vacuum apparatus in which, towards the end of the operation, both low pressure and temperature act together to desiccate only the surface of the meat. After a certain quantity of water has evaporated, ozone (a form of oxygen) is admitted as a sterilizing agent.

Treatment for twenty hours causes the meat to lose about 20 per cent. of its original weight. The quantity of ammonia present (which is indicative of putrefaction) is less in the vacuum-treated meat than in ordinary fresh meat. The new process is said not to affect the composition and appearance of the meat within the protective film on the outside, and the taste is believed to be superior to that of frozen meat.

The chief advantage of the process is that the cost price of meat preserved by the vacuum method is less than that by cold-storage, because it can be treated at the centres of production.

If it is found that desiccated meat can be shipped as ordinary cargo there would appear to be some possibility of a trade becoming established in this article between South America and the West Indies, or what would be preferable, a deflection to the West Indies of some of the best Canadian beef that at present goes in large quantities to Smithfield.—*The Agricultural News*.

MAXIMUM PROFIT FROM PEN MANURE.

The indifferent and careless management of pen manure means the loss of large quantities of available plant food. Liquid excrement is more valuable than solid, pound for pound. Water-tight floors and plenty of absorbents are necessary to prevent its waste. All pen manure is more valuable fresh than after storage. Leaching by rains is one great source of loss. Manure heaps loosely made and located under the eaves or on hillsides lose half of their value. Large losses of nitrogen occur by

fermentation, noticeable by the smell of ammonia. This is due to organisms which require air. Packing the manure pile with a dip to the center and keeping it soaked with water, keeps out the air and reduces fermentation. Fresh manure may be spread at once on moderately level fields. There is little loss by fermentation, and the plant food leaches into the ground. (From Bulletin No. 221, of the University of Wisconsin.)

CEYLON GOOSEBERRY

(From the *Tropical Agriculturist*.)

The tree to which the writer gave the name "Ceylon Gooseberry" some years ago, first in a Departmental Circular on tropical fruits, deserves the attention of fruit growers in the tropics, for few fruits in a wild state appear to offer more promise of improvement by systematic selection and high cultivation. It is a small shrubby tree with ovate, alternate leaves belonging to the family *Bivaccæ* and known to botanists as *Aberia Gardneri*, being named after Mr. Gardner, who was superintendent of Peradeniya from 1844 to 1849. To the natives the tree is known as "Ket-embilla" and an interesting fact in connection with it is that it is endemic in Ceylon, that is having its native habitat confined to this country. The round and slightly velvety berries are somewhat of the size, form and consistency of gooseberries, being purplish in color when ripe. They have a pleasant sub-acid taste and make excellent jam or preserves. The tree thrives best at medium elevations and likes rich humous soil and good drainage. It is readily propagated from seed which, being small, should be sown in pots under cover, using fine sandy soil. The fruit is in season usually in September.

H. A. MACMILLAN.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, February 28, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the two months ending February 28, 1913, as follows:

Cattle Diseases at Pupukea, Oahu.

For the past six or eight months Mr. F. S. Lyman at Pupukea, Oahu, has been losing cattle, mostly milch cows or young animals, a total of fifteen or twenty having died during the

period. Owing to the distance from Honolulu and to the belated reports reaching this office only when the carcasses would be too decomposed for examination, no actual investigation of the disease could be made. The owner was however instructed to secure samples of the diseased organs, if any, and to forward them for examination as soon as a new case should present itself.

On December 31 such samples were received, together with information to the effect that several animals had died during the preceding week. The accompanying description of the symptoms and post mortem changes were strongly indicative of anthrax, especially when considered in connection with the fact that both the owner and a farm hand, who had assisted in disposing of the dead animals, were suffering from pustules on the hands of a very suspicious character.

The sample forwarded for examination consisted of a piece of the small intestine. This was discolored to the extent of being almost black, the intestinal wall, as well as the mucous membrane, being considerably swollen and showing croupous well defined, contour. No sample of the spleen had been sent, but it was stated that this organ was swollen to several times or even diphtheritic areas of varying size, and of irregular, but its normal size and filled with black blood. That the disease was of extremely acute nature was evidenced by a statement to the effect that the dead animals, both milch cows, were apparently sound when they left the barn in the morning, after milking, and, when they did not return in the evening and a search was made, they were found dead, with blood exuding from the natural openings. There was therefore sufficient cause for suspecting anthrax, but careful microscopic examination of numerous slides prepared from the specimen failed absolutely to disclose the presence of the anthrax bacillus.

On January 2, a telephone message was received stating that another cow had died the night before, and no time was lost in reaching the ranch and locating the dead animal. The post-mortem examination revealed the following conditions:

Carcass considerably bloated, blood running from the nostrils and anus. The abdominal cavity contained several quarts of blood-colored serum. Mucous membrane of fourth stomach swollen and congested, though not to the same extent as the small intestines which were found to be discolored, as already described, in their entire length, and showing the same croupous spots and areas. The contents consisted of a dark, blood-colored grumous fluid. The spleen was fully five times its normal size, resembling on section a Texas fever or anthrax spleen. Neither the mouth, gullet or the three first stomachs nor any of the remaining organs, presented anything abnormal, except such changes as might be expected forty hours after

death. In the paunch or first stomach, however, which was fairly well filled with food, were found a large number of kukui leaves besides a number of fragments of a weed, *asclepias curassavica* L., which the owner had already suspected as the possible cause of the many deaths. This weed, belonging to the class commonly called milk weeds, is known to be poisonous, and several extensive outbreaks of disease among cattle in the southern part of the United States have been ascribed to this and closely allied species. The same plant is proclaimed in Australia as poisonous, but nothing definite is known in regard to the active principle it contains. From information gathered on the ranch the weed is said to have a deadening effect upon lips and fingers if handled or tasted, producing a local anesthesia somewhat similar to cocaine, from which facts however it is difficult to deduct any connection with such serious pathological changes as those observed in the dead animals. That no acrid poison is present is obvious from the normal condition of the mucous membrane of lips, tongue, mouth and gullet, but it is therefore not excluded that fermentation or contact with the gastric fluids may produce chemical changes in the poisonous principle of the plant, rendering it acrid after it reaches the fourth stomach, or else, that the supposed anesthetic properties may, when absorbed into the circulation, affect certain nerve centers and cause such vasomotoric disturbances as to account for the sudden effusion of blood into the intestines and the abdominal cavity, as well as for the greatly enlarged spleen.

A careful examination of the pasture in which practically all of the dead animals have been found, showed an abundance of the weed in question, a large proportion of the plants showing plain evidence of having been cropped by the cattle. The weed however is common throughout the Territory, and no previous epidemic is known to have resulted from it, nor are cattle known to eat it, as a rule; but a protracted drought has prevailed in this special neighborhood for the past two years, and grass and forage plants have practically disappeared, root and all, except such weeds as are usually left alone by the animals. The earlier deaths may therefore be ascribed to the cattle eating the surviving weeds, while the more recent deaths, which were then occurring almost daily, were due to the new weed springing up since the rains began a few weeks ago, the cattle eating them with avidity since hardly any grass came up. It is also possible, that the animals may have acquired a taste for the poison such as is known with regard to the loco weed.

As already stated, both the owner and a Japanese farm hand, were suffering from pustules and infected wounds on the hands, and as the local physician happened to call at the time, a slight pustule on the wrist of the owner was opened and

smears made for microscopic examination. The result was negative, and as the same proved the case with the samples secured from the dead animal, the anthrax theory might safely be excluded. A subsequent visit, when another cow had died, failed to furnish any additional light on the subject.

It was therefore decided to follow up the poison theory as far as possible, and the owner was requested to gather a sackful of the weed for experimental purposes. A five-months-old calf was obtained and every known method of inducing the animal to eat the weed was tried, but with little success. Even though nearly starved, being kept on a scant supply of dry hay, the animal absolutely refused to eat the weed, not even when cut up finely and mixed with bran mash or middlings. The experiment is therefore of value only in demonstrating or confirming the theory of an "acquired habit," as there can be no doubt that the weed was found in the stomachs of the dead animals. It also confirms, though to a slight degree only, that not all animals succumb to the temptation. An effort is now being made to induce the calf to eat kukui leaves as these are also known to be poisonous, but so far with little better success.

In the meantime it is to be hoped that the drought is broken and that more suitable feed than the asclepias has come within reach of the remaining animals. No further cases have been reported, and the only advice which could be given in the premises—to eradicate the weed as soon as possible—has been followed in so far as it could be done under the circumstances.

Glanders in Waipio Valley.

Pursuant to the Board's instructions to visit Waipio Valley again within two months after the recent outbreak of glanders had been suppressed, in order to ascertain if possible if any infection might still remain there, I returned to Kukuihaele on the 11th inst. As the Board is aware a concerted effort on behalf of the plantations and ranches in that vicinity, had resulted in Mr. Akaka being provided with horses to take the place of the thirty-four head which were destroyed as being affected with glanders during my two previous visits. As a result of the generous action Mr. Akaka had been enabled to harvest his rice and market it, and was now busy plowing and getting his next crop in the ground.

A new, well-constructed stable, with room for forty horses, had been built on the site I had selected, and in accordance with the plans furnished him, and twenty-nine horses, costing about \$1750.00, or approximately the sum aggregated by appraisal of the destroyed animals, had been purchased and turned over to him. A careful examination of these horses failed

to show the slightest indication of glanders or any other disease. The stable was clean and well kept and formed a great contrast to the shed or shanty where the horses were formerly kept, and which had been completely demolished. As a question had arisen in regard to the actual value of some of these animals, and as I had been asked by one of the contributing parties to investigate this matter, the correspondence pertaining to which is appended, I requested a visiting veterinarian and stock expert to accompany me on my next visit to the valley. This gentleman, Dr. Schutte, who for a number of years has been connected with the Shipman ranches and who may possibly be an applicant for the vacant position of deputy territorial veterinarian for the Hamakua District, expressed himself, after examining each of the horses in question, to the effect, that with one or possibly two, exceptions the animals which had been provided Mr. Akaka at the instigation of this Board, and through the efforts of Mr. O. Sorenson, were in every respect satisfactory for the work and were cheap at the price, \$58.00 per head, which had been paid for them. The two exceptions were a mare too heavy in foal to do much work and another mare of rather vicious disposition and which it might require some time to break to work.

Reimbursement and Legislation.

It would therefore seem as if this somewhat alarming outbreak of glanders has been brought to a satisfactory conclusion, and there remains only the question of public reimbursement of Mr. Akaka for the animals which were destroyed, in order to prevent the spread of this most dangerous and destructive of diseases. This subject has been fully discussed in my previous reports, as well as in the biennial report of this Division now being printed. I would therefore only call the Board's attention to the fact that the question of assisting Mr. Akaka with work animals to take the place of those destroyed by order of the Board, was instigated by the then acting president of the Board at whose direction also the animals were appraised with a view to reimbursement, and to respectfully submit if it does not devolve upon the Board to take the necessary steps for such reimbursement. A draft of an Act covering this subject, and based upon a similar Act recently passed by the State of Florida, has been prepared and is herewith submitted for such disposition as the Board may decide upon.

I beg also to request that the draft of an Act pertaining to bovine tuberculosis and glanders and which was returned to me, be given further consideration in so far as the various subjects are concerned which have not already been disposed of by other acts, as for instance the importation, sale or applica-

tion of tuberculin or mallein without authority from this Board,—the indemnification of owners of glandered horses who voluntarily report such cases to the Board—and obtaining permit of entrance to the Territory for animals by fraudulent means. I also beg to submit draft of a bill forbidding the turning out in pastures or on public highways of animals affected with or suspected of contagious or infectious diseases, as well as a copy of the San Francisco law pertaining to cruelty to animals.

Quarantine Stations.

A final visit to the site of the Hilo Quarantine Station was made during my recent trip to Hawaii when, in conjunction with Dr. Elliot, the final plans and arrangements were decided upon, as per accompanying sketch. As I am instructed that tenders must be asked for covering the entire construction of the station, it will be necessary to have a few blue prints made, but otherwise I believe that my plans and specifications may be used without a costly redrafting of the same. After consultation with Mr. Kennedy and Mr. Forbes we have decided to recommend that the water supply of the station be obtained from a 10,000 gallon tank to be fed from the galvanized iron roofs of the sheds, the largest of which has a surface of 20,000 square feet. In comparison with a pipe line of 800 to 1000 feet this will mean a considerable saving.

I have also consulted Dr. Fitzgerald and submitted for his approval the plan for the Kahului station, as herewith appended, and which he says will be ample for all purposes, but until I have seen the site I cannot judge as to whether it can be built for the money allotted.

In regard to the Honolulu station a separate communication pertaining to the enlargement of the dog section is already in your hands. Estimates for concrete posts for the repair of the horse and mule pens have been asked for, but labor seems to be extremely scarce. These estimates are now on hand, but the price makes it impossible to even consider them. An ordinary 7' concrete post, 4"x4" at the top and 4"x6" at the bottom, corrugated on the two divergent sides, with four reinforcements of $\frac{1}{4}$ " round iron, is estimated at \$1.25, whereas 6"x6" corner posts would cost anywhere from \$2.50 to \$4.00 according to their dimensions. When to this is added freight from Honolulu to Hilo the cost would exceed the available appropriation. These posts may however be made in Hilo and provision will be made in the specification, so that tenders for construction with either redwood posts or concrete posts may be submitted.

The plans and specifications are now finished and blue prints

are being made by the Public Works Department, and as soon as received tenders may be advertised for.

In order to enable me to make plans for the Kahului station it will be necessary for me to see the site provided for the purpose. I would therefore ask the Board to authorize me to go to Kahului on Friday, March 14, on the Lurline and return on the same boat Sunday.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry.

Sir:—I beg to submit herewith a report for the month of February:

Tuberculosis Control.

Very little has been done in this line during the past month, one cow only being tested and passed entering the dairy of Chas. Lucas, Niu. As the services of Mr. Joseph Richards, until recently City and County milk inspector, are no longer available, this most important work will of necessity be held up until it is definitely ascertained whether or not we are to be supplied with an assistant.

Apoplectiform Septicemia in Chickens on Maui.

This highly fatal and rapidly spreading disease has made its appearance in this Territory, among the chickens in the Homestead Lands of Haiku, Maui.

Mr. F. C. Krauss of the College of Hawaii recently received a letter from Miss E. Lindsay, one of the homesteaders of Haiku, Maui, describing the symptoms she had noticed during the outbreak among her chickens, also sending several specimens for examination taken from chickens dead of the disease. The letter together with the specimens were forwarded to this Division for examination, diagnosis and report.

Microscopical examination of the tissues revealed a Streptococcus in almost pure culture. From the symptoms as given in the letter together with finding streptococcus in pure culture a diagnosis of Apoplectiform Septicemia was reported and all possible information regarding the control and prevention of the disease and also a B. A. I. circular written by Norgaard & Mohler dealing exhaustively with this particular disease, was forwarded to Miss E. Lindsay.

The organism which is the direct cause of this disease is to be found in the soil of certain localities, where it is normally saprophytic. Under certain conditions of moisture and temperature, however, it may multiply rapidly and assume a high degree of virulence, becoming a deadly parasite.

Symptoms.

So sudden is the attack that few if any premonitory symptoms are observed. At the most the affected birds may show dullness, apathy and loss of appetite and not mingling with the flock. Death comes suddenly, the bird falling forward flapping the wings a few times in the death agony. The larger number of deaths occur, perhaps, during the night when apparently healthy birds going to roost in the evening are picked up dead in the morning.

Pathological Anatomy.

Post mortem examination of birds dead of the disease shows them to be in good flesh, death coming so suddenly that no emaciation takes place. In the region of the breast and neck upon removal of the feathers numerous subcutaneous hemorrhages of irregular size and outline are found. Upon opening the abdominal cavity a varying amount of a sero-sanguinous fluid is found which coagulates soon after being exposed to the air. The liver is greatly enlarged and considerably congested, the kidneys are somewhat swollen and congested; the mesenteric vessels are greatly engorged with blood and intestines may show many hemorrhagic patches. The intestinal contents are more or less blood stained. The lungs usually show considerable congestion; the heart is pale, flabby and may show a few petechial hemorrhages.

Prevention.

The organism which is the cause of the disease and which is found in every tissue of the body is obtained from a contaminated water supply, generally a water hole which receives the drainage from the surrounding land and to which chickens running at large have free access. The disease is spread by the droppings of the sick birds which contaminates both food and water. Medicinal treatment is of little avail as the onset of the disease is so sudden and birds apparently healthy at night are found dead in the morning.

All effort should be made to prevent the chickens from becoming infected and to stop the spread of the disease. This can be accomplished by putting them in runs and seeing that

they are supplied with pure drinking water in utensils which can be thoroughly cleaned and disinfected. Careful watch should be kept of the flock and all dead or sick fowls removed at once and the yards and house thoroughly disinfected.

Coccidiosis of Fowls.

One small outbreak of this intestinal parasitism has been noticed among two pens of five weeks old chicks at Kaimuki. The owner had been losing his chicks at the rate of from five to seven a day and had finally appealed to this office for a diagnosis of the affection and advice as to its control.

Symptoms.

Those beginning to show signs of sickness presented an unthrifty appearance, the feathers being ruffled up, dirty and looked as if they had been wet and all stuck together. They appeared dumpy, would remain by themselves and while in the first stages the appetite was good, in the final stages they ate but little and so became much emaciated. Diarrhoea soon set in with its weakening and debilitating effects, death taking place in from two to three days. The droppings were somewhat of a clay color containing at times considerable blood which gave them a brick-red appearance.

Pathological Anatomy.

All the organs of the body appeared in a normal condition with the exception of the intestinal tract. The entire intestinal tract was somewhat inflamed but the most striking change was noticed in the caeca which were of a brick-red color and filled with granular fecal material deeply stained with blood and streaked with white. The cloaca contained a fluid, offensive material also brick-red in color, at times strongly resembling pure blood.

Etiology.

Microscopical examination of the contents of the cases and cloaca revealed immense numbers of the *Coccidium Avium*. This coccidium is usually elliptical in shape with a thin shell and, in the state of cyst, measures from 24 to 36 microns long by 12 to 22 microns broad. It is passed out of the body with the feces and in the water or moist earth undergoes further development to be finally taken into the system again with contaminated food or water and reach its final stage of development in the epithelial cells of the intestines.

Intestinal coccidiosis of the fowl often occurs as an epizootic

and attacks nearly as many adults as young chicks. In very young subjects the course of the malady is very rapid while in adults the disease may continue for one or two weeks and it may even pass into the chronic state; the birds are then transformed into veritable skeletons and eventually succumb to progressive wasting and emaciation. The mortality often reaches 60 to 70 percent.

In the state of cocyst more or less advanced, the coccidia of the fowl may exist from one year to another in the damp soil of the poultry yard. They are injected by the birds with their food and water. The most severe outbreaks occur in summer in artificial yards and particularly where air and light are insufficient. It is possible that the disease may be introduced by eggs used in breeding, for Eckhart has found coccidia on the shell and in the white of the eggs from fowls attacked with coccidiosis.

Prophylaxis.

Medicinal treatment does little good in a parasitism of this nature. All affected birds should be removed immediately and destroyed; the place thoroughly cleaned and disinfected, plenty of sunlight let in, and all moist places dried up. The flock should receive plenty of pure drinking water from a source known to be free from contamination and frequently renewed. The feed should be kept where contamination is impossible. Strict cleanliness, thorough disinfection of yards, houses, etc., and plenty of air and sunlight will prevent severe outbreaks of this disease.

Importations of Live Stock at the Port of Honolulu for the Month of February.

During the month fifteen steamers were met and boarded, eleven of which carried consignments of live stock, all of which were inspected and admitted into the Territory. The tabulated list of live stock is as follows.

- Feb. 3.—*S. S. Virginian, Seattle*:
18 horses, S. MacPhearson.
- Feb. 5.—*S. S. Sierra, San Francisco*:
1 dog, J. Van Camp.
46 crates poultry.
- Feb. 6.—*S. S. Tenyo Maru, Orient*:
9 crates pheasants.
- Feb. 12.—*S. S. Lurline, San Francisco*:
19 crates poultry.
26 mules, H. H. & Co.
1 dog, J. J. Fitzgerald.
- Feb. 18.—*S. S. Sonoma, San Francisco*:
1 dog, Bertha Godlewski.
4 crates poultry.

- Feb. 18.—*S. S. Wilhelmina, San Francisco*;
 1 dog, O. A. Steven.
 20 crates poultry.
- Feb. 18.—*S. S. Hilonian, Seattle*;
 10 horses,
 15 mules, Schuman Carriage Co.
- Feb. 17.—*S. S. Persia, Orient*;
 1 crate game chickens.
- Feb. 21.—*S. S. Mongolia, San Francisco*;
 1 crate ducks,
 2 dogs, H. G. Smart.
- Feb. 25.—*S. S. Honolulu, San Francisco*;
 4 horses,
 10 mules, Hon. Plant. Co.;
 26 mules, Schuman Car. Co.
 18 crates poultry.

Respectfully submitted,

LEONARD N. CASE,
 Asst. Territorial Veterinarian.

REPORT OF FOREST NURSERYMAN.

Honolulu, February 28, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir: I herewith submit a report of the work done by the Forest Nurseryman during the month of February, 1913.

Nursery.

| | Distribution of Plants. | | | Total |
|-----------------|-------------------------|--------------------------|--------------|-------|
| | In seed boxes | In boxes transplanted | Pot Grown | |
| Sold | | 575 | 627 | 1202 |
| Gratis | | 800 | 399 | 1199 |
| Total | | 1375 | 1026 | 2401 |

Collections.

| | |
|--|---------|
| Collections on account of plants sold amounted to..... | \$24.35 |
| Rent of Building Nursery Grounds..... | 35.00 |
| Total | \$59.35 |

Plantation Companies and Other Corporations.

The distribution of trees during the month amounted to 198,000 assorted Eucalyptus in seed boxes and 1000 in transplant boxes. A total of 199,000. The balance of trees ordered for this season's planting amounts to 50,000 seedlings and 6000 in transplant boxes ready to set out. These will be delivered during the month of March.

Experimental Garden, Makiki.

The old boiler which we have been using for a sterilizer for the past five years gave out and commenced leaking in several places. To keep the work going we had to make a patch with a piece of boiler plate which we bolted on to the bottom of the sterilizer. This temporary repair will not likely last long and it might be wise to make arrangements to get another sterilizer so that the regular work may not be delayed. We are at present trying to get up a stock of trees to be ready for orders that are likely to come in.

U. S. Experimental Planting, Nuuanu Valley.

The man has been doing the regular routine work, namely hoeing and keeping down grass and weeds.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

 DIVISION OF ENTOMOLOGY.

Honolulu, February 28, 1913.

Honorable Board of Commissioners of Agriculture and Forestry.

Gentlemen: I respectfully submit my report of the work of the Division of Entomology for the month of February, 1913, as follows:

During the month there arrived 32 vessels of which 22 carried vegetable matter and one vessel building sand for concrete work.

Disposal.

| | Lots | Parcels |
|---------------------------------|------|---------|
| Passed as free from pests | 765 | 20,853 |
| Fumigated | 34 | 46 |
| Burned | 4 | 9 |
| Total inspected | 803 | 20,908 |

Of these shipments, 20,729 packages came as freight, 93 packages in the mail and 86 packages as baggage.

Rice and Bean Shipments.

During the month 13,010 bags of rice arrived from Japan; also 1250 bags of beans. All were found free from infestation and were passed.

Pests Intercepted.

Thirty-five packages of fruit and 11 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. Being prohibited, they were seized and burned.

In the packing material about some rose plants from Sydney, Australia, I found several young snails (*Helix aspersa*). This species feeds on decaying vegetation and is classed more as a scavenger than a destroyer of plant life. The snails were hibernating as the opening of the shell was closed by a membranous operculum. This is a good illustration of the possible chance of accidentally introducing such creatures into the Territory and on account of this I have always ordered all packing material destroyed and replaced with moss grown in the islands. A leaf-eating beetle (*Chrysomelid* species) was also found crawling in the same material.

Hilo Inspection.

Brother M. Newell reports the arrival of eight steamers and two sailing vessels. Six steamers brought vegetable matter consisting of 97 lots and 2037 packages. All being free from soil and pests they were passed.

Inter-Island Inspection.

During the month of February 54 steamers were attended to and the following shipments were passed:

| | |
|-----------------|-------------|
| Plants..... | 43 packages |
| Taro | 688 bags |
| Lily root..... | 12 packages |
| Vegetables..... | 1 package |

Total..... 744 passed after inspection.

The following packages were refused shipment:

| | |
|-------------|---|
| Plants..... | 10 packages rejected on account of soil |
| Fruit..... | 16 packages prohibited |

Total..... 26 packages refused shipment.

Respectfully submitted,

E. M. EHRLHORN,
Superintendent of Entomology.

THE GARDEN OF EDEN.

SOMEWHERE IN ARABIA.

The Geographical Journal for August, 1912, reports a lecture delivered by Sir William Willcocks, K. C. M. G., before the Royal Geographical Society on June 10, 1912. Lecturing in November, 1909, in this hall, on "Mesopotamia, Past, Present and Future," he said: I placed the Garden of Eden of our Bible on the upper Euphrates between Anah and Hit. Here must have been the first civilized settlement of the Semites, the ancestors of the children of Israel, as they moved down from the north-west. And it may interest some to know that in the latitude of this region, not far from Damascus, wild wheat plants have within recent years been discovered. The wearing down of the cataracts deprived the settlers of the waters of the friendly river which had watered their garden, and they traveled eastwards and could see behind them nothing but the bitumen springs on the east of Eden, which seemed to them like flaming swords in the hands of the offended seraphim. Like all early peoples they called themselves the sons of men who had already conquered the Tigris-Euphrates delta, and among whom had settled those of their sons whose hands were stained with blood and who could no longer be permitted to reside in the tents of their tribe.

As these people understood nature, the river by itself could not begin life until its waters had mingled with those of the sea, and from their union under the action of the flux and reflux of the tides sprung the marshes where life began on earth. As a matter of fact, salt water never reaches the marshes owing to the delta of the Karan lying between them and the sea.

The effect of the 10-foot tide in the gulf is communicated to the rivers, and travels up nearly 100 miles, but no salt water gets into the marshes. To the writers of these very early epics the Deep was a fresh-water deep.

With translations of the Babylonian tablets of creation in my hand, and the plans and levels of the country before me, I have endeavored, on the spot, to give local color to the passages describing the Garden of Eden of Sumer and Akkad. After some thousands of years, the Euphrates in these reaches is again traversing wide marshes. For some 70 miles in length the river has left its old channel and, flowing over a flat plain some 12 miles wide, is covering it with 2 or 3 feet of water. I have seen Arabs taking reeds and earth and throwing up well-protected banks in the time of low supply and so enclosing areas of land for cultivation and habitation, which will be safe from the attacks of the Euphrates.

THE VIRILE BABYLONIAN.

When human beings first appeared on the earth and for many a generation afterwards, men could only have just held their own against wild animals and, while their dwelling-places were surrounded by forests and jungles, the unending struggle must have left them but little time to make any real advance in civilization. It was far different in oases of Arabia and practical oases like Anah and Hit on the upper Euphrates. Here it was possible for men to destroy the existing wild beasts and as their numbers could not be recruited out of the deserts, they were exterminated; and men had leisure to become gradually civilized. "Amalek was the first of the nations," was spoken with knowledge of the Arabs stretching from the delta of the Nile to the upper Euphrates. Living in tents and using gourds for vessels, they have left no traces such as we see in Egypt and Babylonia; but Arabia has been able to pour forth from her parched loins her virile sons who began the subjugation of both the Nile valley and the valley of the Euphrates. Everything in Egypt was easy and to hand; the Nile was and is the most stately and majestic of rivers and carrying a moderate amount of deposit creates no serious difficulties for the dwellers on its banks; the Garden of the Lord, the land of Egypt, is very fertile; and the climate is mild in winter and never parches in summer. Egypt, therefore, produced no world ideas. None of her sons were possessed of a fine frenzy with eyes glancing from heaven to earth and earth to heaven. It was far different with Babylonia. The Tigris and Euphrates in flood are raging torrents and their ungoverned and turbid waters need curbing with no ordinary bridle. Babylonia's soil is very fertile, but the winters are severe indeed and the summers savage and prolonged. The range of temperature is between 20° and 120° in the shade. Brought up in a hard school they possessed virile intellects. Moses' first contact with Babylonian beliefs and creations in the house of the priest of Midian on the slopes of Horeb, entranced him; in the burning bush of the deserts he saw the footsteps of the Almighty, while heavenly voices spoke to him out of the storms raging on the summit of Sinai. In connection with this we must remember that Moses' wife is called, in one place, a daughter of the priest of Midian, and in another a Cushite or Babylonian woman. Her father was probably a learned Babylonian exercising priestly functions among the Arabs.

The extraordinary dry heat of the summer, by day and by night, gives a luster to the stars, a distinctness to the constellations, and a glow to the fields of powdered stars (called here the milky way) which cannot be conceived by one who has not spent the whole summer in the plains of Shinar. The sons of Sumer and Akkad were the first astronomers and thinkers of the world. They divided the year into months, the months into weeks and

the weeks into days, on a system which lasted to the days of Julius Caesar. They created the sabbath day, peopled heaven with Cherubim and Seraphim, and they first saw Orion leading out the starry hosts of heaven. Perennial irrigation was their creation and that in the face of floods such as the Tigris and Euphrates bring down. By their skill they introduced wheat on the Earth, but in the domain of abstract thought they were especially predominant. In evolution they out-Darwined Darwin.

Seeing the delta of the rivers which had been at the mercy of the high floods, gradually reclaimed, and steady progress on every side of them, they cast their thoughts back and saw as the beginning and origin of everything, infinite chaos represented by the devastating spirit of the floods of the river mingling with the wasteful spirit of the sea and producing monstrous births; but less monstrous than themselves. Tiamat, through her union with Apsu, gave birth to Lakhmu and Lakhamu, and ages increased, and Ansar and Kisar were born. Long were the days and different gods came into existence; then long intervals of time elapsed and the good gods were evolved, each better than those who gave them birth, until finally Marduk appeared, the greatest and most beneficent of all.

SITE, OF THE GARDEN.

Now, where was the original home of these interesting people, to whom we all owe so much? For reasons already given, it must have been in some country of oases surrounded by deserts, and Arabia is such a country, and at their very doors. The oases of Arabia are close at hand to both the Nile and the Euphrates and the natural overflow of the surplus population would be Egypt and Babylonia.

Every part of the Euphrates delta, from Hit to the Persian gulf, has at some time or another been called "Eden," the irrigated and cultivated plain, as distinct from "Kura," the unirrigable hill or plain. So in Egypt today the "reef" is the irrigated plain and everything else is the "jebel," the desert where there is no rain and hill or mountain where there is rain. Soil and climate are eminently suited to fruit gardening. From date palms and oranges to peaches and plums every fruit tree is at home. The date palm is really the indigenous tree of the country. "Put its feet in water and its head in hell and it will do all the rest," is the saying of the people.

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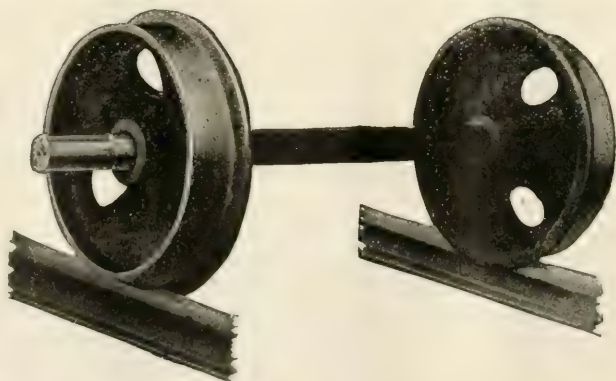
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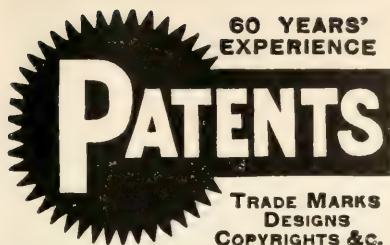
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PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 83 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

- * "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- * "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

* "The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- * "Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- * "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- * "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- * "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- * "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- * "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
- * Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- * "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- * "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
- Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
- Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
- * "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
- * "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
- * "To Amend Rule 1. Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
- * "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
- * "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
- Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.
- Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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APRIL, 1913

No. 4

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughts, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications
**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207
HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

APRIL, 1913.

No. 4.

Again the Superintendent of Entomology, in his report for March, is able to show various dangerous pests refused admittance to the Territory. The value of the Division of Entomology to the islands can hardly be measured in dollars.

There is much gratifying information in the reports of the Superintendent of Forestry and the Forest Nurseryman for March. The establishing of three additional forest reserves on Oahu, containing an aggregate of 6368 acres, with another one projected for the mountain section back of Honolulu, is striking evidence of advancement. Then there is the distribution of plants for forestation in the country and gardens and orchards in town—about sixty thousand to corporations and over four thousand to the general public in one month—showing practically universal interest in forestry and domestic arboriculture.

The reports of the division of animal industry for March contain evidence that the island of Oahu, constituting the City and County of Honolulu, is now practically rid of tuberculosis in dairy herds. There is also gratifying testimony of a high degree of sanitary conditions prevailing in most of the dairies of the island. This wholesome state of affairs with regard to the sources of Honolulu's milk supply, as well as that of the teeming plantations, has been brought about from quite antipodal conditions that existed three years ago. It is all much to the credit of the Division of Animal Industry and the Board of Supervisors of the municipality, the latter having started the work of redemption by the passage of a pure milk ordinance.

CLEAN CULTURE IN AUSTRALIA.

Under the heading of "Fruit Fly and Codlin Moth," the Agricultural Gazette of New South Wales makes the following remarks. They show the importance placed on clean culture in beneath the Southern Cross, emphasized as it is by penal laws—something that is needed in Hawaii:

"It seems almost incredible that any fruit-grower who is alive to his own interests would allow fly or moth-infested fruit to lie on the ground until the grubs have left them, but such is the case, and it is to these careless growers that we are usually indebted for the breeding and spreading of many of our pests. It is also these growers who give so much extra trouble to our inspectors under the fruit pests act, in seeing that no neglect takes place. It may be well for such careless growers to remember that they are a menace to their neighbors, and that by neglecting to pick up and destroy all fallen and infested fruit, they are liable to a fine. Any fruit-grower would be quite justified in notifying the department whenever he is sure that his neighbors are trying to shirk their responsibilities in this matter."

FRUIT FLIES.

Several months ago fruit of *Eugenia malaccensis* Linn., obtained in the market, was found to be infested by dipterous larvae, which at first were thought to be of the Mediterranean fruit fly (*Ceratitis capitata* Wied.), but upon determination they were found to be of the mango fruit fly (*Dacus ferrugineus* Fabr.). These flies are quite common through Java, India, Ceylon and Amboina, as well as the Philippines, and cause considerable damage to fruit. They do not confine themselves to any one class of fruit, but are particularly injurious to the mango and citrus fruits. Over fifty species of the genus *Dacus* have so far been described from Malaysia.

A late shipment of *Citrus hystrix* DC. from Bohol contained numerous dipterous larvae which have not as yet emerged, but which are in all probability of the above species.—C. R. Jones, Entomologist, in *Philippine Agricultural Review*.

SUNFLOWER POTASH.

The south of Russia is noted as the great sunflower district of the world, but only recently have the stalks, usually considered a useless by-product, been made to produce potash. The ashes of these stalks are rich in potassium salts and some 7000 tons of this potash fertilizer are annually exported from the north Caucasus district. When we realize what an almost infinitesimal part of the weight of the plant is its ashes, we are forced to regard the sunflower crop of that district as something more than remarkable.—*Philippine Agricultural Review*.

BOARD OF AGRICULTURE AND FORESTRY.

(Honolulu Star-Bulletin, March 22.)

Positive ground was taken against the introduction to Hawaii of any bird that might possibly become a nuisance, at a meeting of the board of agriculture and forestry yesterday. It was the house wren that was particularly tabued, it having been mentioned in a list of birds recommended for importing. At the same time official salt was held out for the tails of a species of quail and the teal duck, the members being in favor of increasing the number of game birds here.

The meeting was held at the office of the Waterhouse Company, Ltd., Stangenwald building. With President Walter M. Giffard were present Commissioners H. M. von Holt and John M. Dowsett, and Ralph S. Hosmer, superintendent of forestry.

Reports of divisions for January and February were received. A favorable report of the forestry committee on the Makua, Kuohalu and Nanakuli proposed forest reserves was adopted.

Mr. von Holt made an oral report that the fencing of the Nanakuli forest reserve was required by the existing lease.

There was a discussion of boundaries of the Paumalu forest reserve on this island, with regard to encroachments by adjacent property owners. The question seemed to turn on the water privileges of homesteaders.

Mr. Hosmer explained the situation. There were springs in two parcels of land, which had been reserved, one of fourteen and one of fifteen acres, each surrounded by homesteads. He said the matter was now one of policy.

The matter was referred to the forestry committee for investigation.

It was announced that Mr. Hosmer would go to Maui next week to investigate encroachments of cattle on the Polipoli Springs reservation.

J. F. Rock, botanist, wrote asking for assistance in the publication of his book on Hawaiian trees. The matter was referred to the finance committee.

Mr. Hosmer requisitioned \$200 for a sterilizing garden, which was granted.

An appropriation to pay for additional forest fire protection service in the Manoa section was allowed.

Mr. Hosmer wrote recommending a reservation of the watershed back of Honolulu, and asking that restriction be placed, in the meantime, on the cutting of trails between Nuuanu and Palolo valleys. In reply to a question he explained how trails not properly laid out might increase the danger of fire. His idea was that the thing should be under definite control, which was not the case now.

Mr. von Holt said he had asked the question because he did not think the board should take arbitrary action in a matter in

which the public was interested. He related his own experience in cutting trails in the Waiahiua district, where the vegetation had speedily covered the ground again.

The proposals of Mr. Hosmer were unanimously confirmed.

Prof. W. A. Bryan of the College of Hawaii wrote the board on behalf of the introduction of the house wren, the teal duck and a species of quail.

There was united opposition to the wren as being a bird that was liable to show no discrimination between friends and foes of vegetation in feeding upon insects. As to the quail and teal, the members agreed that such game birds should be welcomed.

Dr. Norgaard sent in a requisition, with plans and specifications, for an addition to the kennels at the animal quarantine station. The estimated expenditure was authorized.

On the recommendation of Entomologist Ehrhorn, the board appointed E. R. Bivens honorary plant inspector at Kahului, in place of M. Eyton, resigned.

President Giffard brought up the matter of shipment of fruits from Maui to Oahu, a question having been raised as to the expediency of enforcing the regulation against such traffic, in view of the fact that this island has the fruit fly and the Maui fruits in question are clean.

It was voted that the executive officer notify the president of the Maui Chamber of Commerce that the shipment of fruits from Maui would not be interfered with, for the present at least.

The president reported that he had received a cablegram from Professor Silvestri announcing his arrival at Capetown with five species of parasites of the Mediterranean fruit fly, three of them certain and two doubtful, and would proceed to Australia, where he hoped to propagate colonies of the certain species in particular.

He also reported that Professor Muir, who was going to leave for Japan next week, would, through the courtesy of the Planters' Association, secure for the board a parasite of the Japanese beetle if he ran across such.

The meeting discussed pending legislation relating to the department; also sundry financial matters.

DIVISION OF FORESTRY.

Honolulu, April 1, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of March, 1913.

BIENNIAL REPORT.

During the first part of the month not a little of my own time was occupied in reading proof and attending to other details in

connection with the publication of the biennial report of the Board for 1911-1912.

The full report—a book of 258 pages, illustrated by 36 full page plates—was issued on March 19. The first copies were sent to the Governor and Members of the Legislature on that day. Since then a very general distribution of the report has taken place, to persons on the Board's mailing list throughout the Islands.

The edition numbered 1750 copies of the full report, and 750 each of the separates of the three divisions. Any resident of the Territory may obtain a copy of the report upon application to the Clerk of the Board of Agriculture and Forestry, Box 207, Honolulu.

FOREST RESERVES.

At the meeting of the Board of Commissioners held on March 21, three forest reserve projects on the Island of Oahu were approved and ordered sent to the Governor with the request for a public hearing. The proposed reserves are Kuaokala, 434 acres; Makua-Keaau, 4924 acres, and Nanakuli, 1010 acres—all in the District of Waianae.

During the month the Survey Office completed a map of the mountain section back of Honolulu, on which I have sketched a line which I recommend as the forest reserve boundary. As soon as the official description of this line is ready, a report recommending the creation of the Honolulu Forest Reserve will be submitted to the Board for its approval.

TRIP TO MAUI.

The last few days of March I spent on the Island of Maui, making an inspection of work being done in fencing and forest planting, under Government Land Office leases, in the Kula Forest Reserve, and of other similar work in the Makawao Forest Reserve. This trip forms the subject of a special report shortly to be submitted to the Board.

FOREST FIRES.

On the afternoon of March 13 there occurred a brisk grass and brush fire on the slope of Pacific Heights that for a time looked as if it might cause somewhat serious trouble. A Japanese named Nakana, on Laimi road, Lower Nuuanu Valley, was clearing land and burning brush. Left for a little while unwatched, the fire got away, and spread up the steep, grassy slope to the ridge of Pacific Heights. Here its advance was stopped by four men from the Honolulu Fire Department and a squad of a dozen Territorial prisoners sent from the jail, upon request, by High Sheriff Henry.

Thanks to Mr. E. M. Ehrhorn, the Superintendent of Forestry

and the Forest Nurseryman were got quickly to the scene of the fire by automobile. Nakana had secured ten or twelve men who fought the fire from below, under the direction of Mr. Haughs, while on the ridge the firemen and prisoners, with the Superintendent of Forestry, kept it from crossing into Pauoa Valley. Had the fire got over into Pauoa, it might easily have run up to the forest.

The thanks of this department have already been officially given to the Chief of the Fire Department and to High Sheriff Henry for their prompt and efficient response to our call for help. But it is only fitting that an additional expression of appreciation should here be made public, for without their assistance this fire could not have been checked when and where it was.

Earlier in the month, on March 9, a grass fire on the lower Ewa ridge of Kalihi Valley, called the Forest Nurseryman and one laborer from the Government Nursery to that valley, where they remained on duty from late afternoon to well into the evening, when the fire burned itself out on a rocky slope.

On Sunday, March 30, a grass fire is reported to have burned over five or six acres on the land of Honouliuli, Ewa District, Oahu, above the holdings of the Kunia Development Company. This fire is supposed to have been started by pig hunters, but no positive evidence could be secured. The fire was put out by a gang of about 50 men got together by the Kunia Development Company. It was stopped in the edge of the trees on the slope of the Waianae Hills.

The only way to prevent forest fires is for everyone to be extremely careful. Using the Pacific Heights fire as a text, the Superintendent of Forestry prepared warning editorials which were given good space in both of the local newspapers, the *Advertiser* and the *Star-Bulletin*.

The rains of the latter part of the month have now temporarily reduced the forest fire danger but only until the next dry time.

The use of fire anywhere near the forest must be strictly guarded. In a dry time it is imperative that every precaution be taken.

NEW FIRE WARDENS.

Several changes in the staff of District Fire Wardens were made at the Board meeting of March 21, 1913, by the appointment of the following gentlemen for the districts named:

Oahu.

H. Bleifield Brown. In and for that portion of the District of Ewa, lying to the east of the main government road between the land of Wainio and the Kaulaonahua gulch.

George M. Robertson. In and for that portion of the District of Waialua lying between the Halemano and Opauala gulches.

George Wilson—In and for that portion of the District of Wai-
alua lying between the Opaepula gulch and the Koolauloa District
line.

Otto Ludloff—In and for that portion of the District of Koo-
laupoko, extending from and including the land of Heeia to the
land of Kailua.

Maui.

Arthur K. Jones—In and for the Districts of Honuaula and
Kahikinui.

Hawaii.

George Gibb—In and for that portion of the District of Kau,
extending from the land of Punaluu to the Kona District line.

Donald S. McCalister—In and for that portion of the District
of Hilo extending from and including the land of Kukaiau to the
Hilo District line.

During the past month a fresh supply of cloth fire-warning
notices, with a circular letter regarding the posting of same, were
sent out to all the district fire wardens throughout the Territory.
The publicity thus given to the forest fire law undoubtedly helps
to make people more careful about using fire near the forest in
that it brings to their attention the penalties provided by law in
case of a fire spreading through carelessness or neglect.

VISIT OF THE LEGISLATURE.

On Friday afternoon, March 7, the members of the Senate and
House of Representatives visited the offices of the Board of Ag-
riculture and Forestry. Each of the Chiefs of Divisions spoke
briefly to the party on the work and needs of his Division.

In company with the Executive Officer of the Board, the Super-
intendent of Forestry appeared before the House Committee on
Agriculture on March 12, in the interest of pending legislation.

REPORT OF THE FOREST NURSERYMAN.

As usual, the report of the Forest Nurseryman for the past
month is transmitted herewith. In this connection it may not be
inappropriate, in view of newspaper comment that has recently
been made on the subject, to call attention to the fact that as a
part of his work of giving advice on the care of trees, the Forest
Nurseryman, Mr. David Haughs, has for some time past, and
especially in the last few months, given considerable time to an-
swering repeated requests for advice from persons interested in
taking proper care of street trees. This assistance has been given
both to individuals and to organizations. It is one of the ways

in which the Division of Forestry is of practical service to the people of this community.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, March 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is a report of the work done during the month of March, 1913:

Nursery.

Distribution of Plants.

| | In Seed Boxes. | In Boxes Transplanted. | Pot Grown. | Total. |
|------------------|-------------------|---------------------------|---------------|------------|
| Sold . . . . . | .... | 500 | 90 | 590 |
| Gratis | 1000 | 186 | 2372 | 3558 |
| | <hr/> 1000 | <hr/> 686 | <hr/> 2462 | <hr/> 4148 |

Collections.

Collections for the month are as follows:

| | |
|---|---------------|
| Plants sold | \$ 4.05 |
| Cordwood from Tantalus | 30.00 |
| Rent of building, Nursery grounds | 35.00 |
| Total | <hr/> \$69.05 |

Grass Fire at Honouliuli Ranch.

On Sunday afternoon, April 6, at 1:30 o'clock, Mr. A. W. Van Valkenburg reported that a grass fire was raging on the lands of the Honouliuli Ranch mauka of the Kunia Development Company's lands. Mr. Van Valkenburg at once called all the available men in the neighborhood to his assistance and after a few hours' hard fighting the fire was put out. Mr. Van Valkenburg reports that the area burned over amounted to about six acres which consisted of grass and brush. No traces of the person or persons who started the fire could be found.

Plantation Companies and Other Corporations.

Orders received during the month amounted to 7000 trees ready to set out. These are being propagated and will be delivered as

soon as they are ready. Trees to the number of 59,596 were distributed as follows:

| | |
|----------------------------|--------|
| In seed boxes..... | 50,000 |
| In boxes transplanted..... | 3,020 |
| Pot grown | 6,576 |
| Total..... | 59,596 |

The above number completes all the orders on file with the exception of those received during the month.

Experiment Station, Makiki.

The men are busy transplanting and doing other routine work. Our stock both at Makiki and the Nursery has been so greatly reduced owing to the large demand for trees that it will take some time to again replenish it.

U. S. Experimental Planting, Nuuanu Valley.

The man has been doing the regular routine work and the different plots are now in good condition. Arrangements are being made to start transplanting a number of new varieties of Eucalyptus, and a small nursery for that purpose will be located alongside of the quarters just below the dam. The planted part will not require much more care, and the man can spend most of his time transplanting and getting trees ready for more plots.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, March 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—Reporting on the work of this Division during the month of March, my principal effort has been directed toward the completion of plans and specifications for the quarantine stations of Hilo and Kahului, and to the enlarging and reconstruction of the Honolulu quarantine station.

In my report for the preceding month, February, I recommended that six additional kennels be built, the number of dogs arriving here constantly demanding such enlargement of the station, and as soon as I was notified that the Board had decided to grant this request I went to work to have it carried into effect. It proved, however, almost impossible to obtain carpenters or contractors who would undertake the work except at exorbitant

prices, one contractor asking nearly double the price of my personal estimate of the cost.

I finally secured a Portuguese carpenter with two laborers at respectively \$3 and \$1.50 each, who under my personal and constant supervision have now nearly finished the construction of the six new kennels. A statement of the cost to date is herewith appended.

| | |
|-------------------------------------|----------------|
| Lumber, nails, hinges, etc..... | \$ 35.00 |
| Wire fencing, 260 feet at 37½c..... | 97.50 |
| Two gates at \$7.50..... | 15.00 |
| Woven wire for tops..... | 3.00 |
| Stain and paint, etc..... | 12.50 |
| Labor to date, 8 days at \$6..... | 48.00 |
| Estimated cost to finish..... | 30.00 |
| Total..... | <hr/> \$241.00 |

This total, which exceeds my estimate of \$225 but slightly, and is far below the submitted bid of \$360, could only have been attained through my personal attention and supervision of the work. For this reason I am of the opinion that the Hilo and Kahului stations can be built economically only if undertaken in the same manner. Tenders will, however, be asked for, but if the bids should prove exorbitant or beyond the sum appropriated for the purpose, I feel sure the stations can be built under my personal supervision with the means at hand.

Six blue prints and an equal number of specifications have now been prepared for the eventual bidders, and it is suggested that tenders be advertised for in one Hilo and one Honolulu paper, through the Department of Public Works. Three of these sets should be placed with the Deputy Territorial Veterinarian at Hilo and the other three remain with the Public Works Department here.

The plans and specifications for the Kahului station will be ready in a few days.

The unusually large number of horses and mules which have arrived here during the past two or three months, as well as those expected to arrive shortly, have made it impossible to undertake any extensive reconstruction work at the Honolulu station, and I have therefore been forced to limit this work to the replacement of posts and the temporary repair of fences until one or more of the most damaged paddocks can be spared for actual rebuilding.

Bovine Tuberculosis Control Work.

In connection with this most important work I have asked my assistant, Dr. Case, for a concise statement as to the present status of this work, a copy of which is herewith appended. From this it will be seen that no milk from tuberculous cows is allowed to

reach the consumers in the city or county, a condition which should be extended to the entire Territory. In any case it is about time that the fourth annual test should be begun in order that the few remaining infected animals may be apprehended before they have a chance to again distribute the disease to other animals. In this connection I have closely followed the work being done in other States and especially in California, where there is now a strong tendency to revert to the physical examination method, as practiced in Germany, and to resort to the tuberculin test only when the bacteriological examination of the milk shows the presence of the tubercle bacillus. In this matter California has proven herself years behind many of the other States, and the obvious result, that is, the constant spread and increase of the disease, must become apparent in a very short time. Without the constant and conscientious application of the tuberculin test, and the elimination of *all* infected (reacting) animals from the dairy herds, tuberculosis, human as well as bovine, will persist and will continue to take its toll of human lives, especially of children whose principal food consists of milk. This fact is so incontrovertibly demonstrated and has so often been presented in these reports that it should not be necessary again to urge the necessity for continuing the work which has already given such great results. A glance at the table prepared by Dr. Case will show the preponderance of clean dairies, and this, in connection with the splendid work done by the Dairymen's Association, should be sufficient incentive to forge ahead and rid the dairy herds of this county at least of the last trace of infection, and then see to it that no new infection gains entrance, either from the other counties or from abroad. To continue this work, however, this Division must have another assistant (former municipal Milk Inspector Joe Richards is recommended), and the subject is brought up here because a number of the dairy owners in Honolulu are daily asking *when* the next test is going to be made. Many of the milk producers who are earnest in their endeavors to furnish clean milk are anxious to know whether their herds are still clean or whether the insidious infection may have returned since their animals were last tested. With the use of the automobile many of these cases could be attended to especially if the assistant above referred to were appointed, but without it nothing can be done. The daily and prolonged visit to the Quarantine Station requires the use of the horse and buggy, while the attention to incoming steamers and the inspection of imported stock must be done by means of street cars and hacks. As the machine is now in perfect shape except for a few minor repairs (speedometer, \$5, and new fenders, \$38—not absolutely necessary at the present time), I am informed that it can be used for some months at the actual cost of gasoline and oil. I would therefore recommend that the machine be returned to the Division for such work as it is deemed advisable not to postpone any longer than absolutely necessary.

In conclusion, I beg to recommend that the caretaker of the Station be provided with an assistant without further delay. No manure has been gathered for a number of months, and as it becomes more and more evident that one man is required in the dog division practically at all times, and that the feeding and care of from 50 to 75 horse and mules, even with the assistance of the owners' employees, necessitates the employment of another man, I would urgently recommend that provision be made for the same. Owing to the fact that there is no place where an additional man could be quartered, I doubt whether a reliable person can be obtained for less than ten dollars a week (citizen labor).

Trusting that your honorable Board will consider that the importation of live stock and other animals is a subject of the greatest importance when viewed from the standpoint of encouraging such importations and at the same time excluding infectious and contagious diseases, I would earnestly recommend that the above suggestion be given due consideration.

Very respectfully,

VICTOR A. NORGAARD,

Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, March 31, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry.

Sir:—I beg to submit the following report for the month of March, 1913:

Tuberculosis Control.

Replying to your request for a concise statement showing the present status of the tuberculosis control work on this island, I submit herewith in tabulated form, the work accomplished during the past three years—1910, 1911 and 1912—giving the total number of animals subjected to the test, the number passed, condemned and suspicious, and the percentage of reactors.

During the month only two family cows have been tuberculin tested, both of which passed.

Commercial Dairies, City of Honolulu:

| | 1910. | 1911. | 1912. |
|------------------------------------|-------|-------|-------|
| No. of dairies | 50 | 65 | 60 |
| No. of animals tested | 1516 | 1538 | 2237 |
| No. of animals passed | 1033 | 1386 | 2091 |
| No. of animals condemned | 440 | 152 | 146 |

Private Dairies, City of Honolulu:

| | | | |
|---------------------------------|----|----|----|
| No. of dairies | 13 | 31 | 15 |
| No. of animals tested | 28 | 70 | 31 |

| | | | |
|---|-----|-------|-------|
| No. of animals passed | 23 | 67 | 28 |
| No. of animals condemned | 5 | 3 | 3 |
| Country Dairies and Ranches, County of Honolulu: | | | |
| No. of dairies | 9 | 34 | 32 |
| No. of animals tested | 573 | 2451* | 3022* |
| No. of animals passed | 539 | 2388* | 2968* |
| No. of animals condemned | 26 | 63 | 54 |

*Total Number Tested and Percentages of Tuberculous
Animals.*

| Year. | Total Tested. | Passed. | Cond. | Suspicious. | Pctge. |
|------------|---------------|---------|-------|-------------|--------|
| 1910 | 2117 | 1595 | 471 | 51 | 22.24% |
| 1911 | 4059 | 3841 | 218 | .. | 5.39% |
| 1912 | 5290 | 5087 | 203 | .. | 3.81% |

A study of the above table shows a gradual extension of the work in the control and eradication of bovine tuberculosis. More territory has been covered each year, an increasingly larger number of animals subjected to the tuberculin test and a certain, steady decrease in the percentage of tuberculous animals in the dairy herds accomplished.

The figures and resulting percentages in the above table differ somewhat from those as given in the last biennial report because of the fact that in this computation the calendar year was used as a basis instead of the various tests designated as Nos. 1, 2 and 3. The difference, however, is slight.

A study of the work accomplished in 1912 will give an adequate conception of what is to be done in this direction this year on the fourth general test of the dairy herds of the city and county. In 1912, 107 dairies were visited, of which number 60 may be considered city dairies, 15 private dairies and 32 county dairies. A total of 5290 animals were subjected to the intradermal tuberculin test, of which number 5087 were passed and 203 condemned.

Of all the animals condemned during the years 1910, 1911 and 1912, a total of 892, we can conscientiously say that not one remains alive. The dairy herds are entirely free of condemned cattle and not a drop of milk reaches the consumer from cows known to be tuberculous. In the accomplishment of these great results we have been aided in every possible way by the dairy owners themselves, which speaks volumes for our consistent campaign of education.

The sanitary condition of the dairies has advanced step by step with the eradication of tuberculosis from the herds, and while there is still room for improvement, sanitation has advanced one hundred per cent. over and above conditions in 1910. The

*Principally range cattle.

frequent visits paid to the dairies in the course of testing has been a potent factor in keeping hygienic methods before the owners and bringing about their adoption. While there is no dairy which could be termed excellent, with the exception of that of the College of Hawaii, which is managed with the model type constantly in mind, there are many good, many fair and none which can be called bad.

Standing between the producer and consumer, and handling more than three-quarters of the milk produced in the city and county, we have the Honolulu Dairymen's Association, a co-operative institution in which many of the leading dairymen are represented, and which was designed to furnish the city with an ideal milk supply.

I think I am correct in stating that it is the present policy of the Association to accept milk from only those dairies whose sanitary and hygienic conditions entitle them, under the Milk Ordinance, to sell milk. While in some instances milk has been accepted from dairies not permitted, under the ordinance, to sell milk, it has been, I believe, through ignorance on the part of the management, to the exact conditions and standing of said dairies. Upon reaching the Association the milk is electrically purified, the result being a clean, palatable product with excellent keeping qualities, and having a very low bacterial count ranging from 500 to 1000 organisms per cc.

Importations of Live Stock.

During the month of March twenty-two steamers were boarded, eight of which were found carrying live stock, as follows:

March 3—S. S. Sierra, San Francisco: 1 dog (Irish terrier), Paul Isenberg; 36 crates poultry.

March 11—S. S. Lurline, San Francisco: 4 mules, A. W. Eames; 24 mules, Club Stables; 1 dog (English setter), G. L. Keeney; 10 crates chickens, N. B. Lansing; 1 crate chickens, W. F. X. Company.

March 17—S. S. Ventura, San Francisco: 1 crate chickens, Yee Hop.

March 18—S. S. Wilhelmina, San Francisco: 20 crates poultry.

March 21—S. S. Korea, San Francisco: 1 dog (Airedale), Lieut. McCleave.

March 21—S. S. Mexican, Seattle: 2 horses, U. S. A.; 3 dogs (water spaniel), Capt. W. S. Sinclair.

March 25—S. S. Honolulu, San Francisco: 46 mules, Schuman Carriage Company; 2 mules, M. Andrade; 1 horse, E. Duiembere; 4 Berkshire boars, Hawaii Meat Company; 1 dog (pointer), P. Isenberg; 23 crates poultry.

March 1—S. S. Sierra, San Francisco: 10 crates white leg-

horns, C. A. Bortfeld; 12 crates white leghorns, N. E. Lansing;
1 crate brown leghorns, F. L. Waldron.

Respectfully submitted,
L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of March, 1913, as follows:

During the month 39 vessels arrived, of which 25 carried vegetable matter and one vessel moulding sand.

| Disposal. | Lots. | Parcels. |
|--------------------------------|-------|----------|
| Passed as free from pests..... | 878 | 22,221 |
| Fumigated | 15 | 329 |
| Burned | 69 | 87 |
| Total inspected | 962 | 22,637 |

Of these shipments, 22,264 packages came as freight, 174 packages in the U. S. mail and 199 packages as baggage.

Rice.

During the month 32,349 bags of rice arrived from Japan and 500 bags of rice from China. All were found free from infestation and were passed.

Pests Intercepted.

Sixty-two packages of fruit and 25 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, which were seized and destroyed.

In one box of orchids from Manila a species of Thrips, some caterpillars (Lycaenid species), three species of ants, several flea beetles, several larvae of a tiger beetle (Cincindelidae) and three other species of beetles were found dead in the loose rubbish after fumigation.

Some hibiscus cuttings from Tutuila were infested with the black scale *Saissetia nigra* and *Hemichionaspis minor*.

One lot of chestnuts from Japan was found infested with weevils and destroyed.

Hilo Inspection.

Brother M. Newell reports the arrival of four steamers and two sailing vessels, the former bringing 127 lots and 2783 pack-

ages of fruit and vegetables. One case of soil-covered celery was cleaned and one case of Aphis-infested Kohlrabi was fumigated before delivery. Six tons of moulding sand were passed after careful examination. It is now reported that in June the first direct steamer from Japan will arrive at Hilo. I have given Brother Newell full instructions about rice shipments. He has notified the consignees about infested rice and I do not anticipate any trouble.

Inter-Island Inspection.

During the month of March 58 steamers were attended to and the following shipments were passed:

| | |
|----------------------|-------------|
| Plants | 91 packages |
| Taro | 786 bags |
| Lily root | 22 packages |
| Vegetables | 3 " |

Total passed after inspection.... 902

The following packages were refused shipment:

| |
|--|
| Plants—Rejected on account of soil... 8 packages |
| Fruit—Prohibited 14 " |

Total refused shipment.....22 packages

Two boxes of parasite material of the cotton boll worm arrived from India for Mr. D. T. Fullaway of the U. S. Experiment Station and were opened in my presence. This material was forwarded to Mr. Fullaway at my request after consultation with the President of the Board, he having better facilities for caring for the same.

The Japanese beetle is again giving a lot of annoyance and I have inoculated a number of lots which were brought to the laboratory by interested residents. We can do considerable work in this line if people will furnish the beetles, but we have no time to collect beetles for distribution, therefore all who take interest enough to bring in beetles for inoculation will be supplied with them.

Respectfully submitted,

E. M. EHRLHORN,
Superintendent of Entomology.

There seems to be a general revival of silk culture throughout the tropics. Recently the Madagascar government has taken steps to encourage mulberry growing in that island and the classification of cocoons is to be made a matter of government regulation. The writer has personal knowledge of the excellence of the silk fabrics made by the Madagascar natives. Some very fine specimens of "Malagasy" silks are obtainable in most of the East African ports. This silk seems to be the product of a local caterpillar, probably native to the island.—*Philippine Agricultural Review*.

ELECTRICAL TAPPING OF RUBBER TREES.

According to *The India Rubber World* of New York, there appears a possibility of the old system of rubber tapping, which has existed for nobody knows how many centuries, being superseded by a new invention of a German scientist, Mr. George M. von Hassel, who has been employed for many years by the Peruvian Government to explore the resources of its rubber territory. This gentleman, says our contemporary, who is a civil engineer by profession, has devised a method of extracting rubber from the tree which, if not instantaneous, is at least rapid and efficacious in its operation, and if it works out in practice as it has given promise of doing in the various tests to which the process has been subjected, it may probably be adopted. Here, briefly, is the apparatus that he has devised: He places upon the trunk of the rubber tree a piece of sheet iron about five feet long, five inches wide, with the two sides folded back against the tree to a thickness of about two inches, constituting a hollow channel of sheet iron. This hollow channel is divided into a series of fifteen to thirty sections; the number of sections depends upon the number of days the apparatus shall be worked. Each section has a mechanism for the extraction of the latex from the rubber tree and a receptacle for receiving the flow, which also contains a preparation for the coagulation of the latex. When working *Hancornia* and *Castilloa* trees, plates provided with longitudinal canals are used instead of the receptacles for gathering the latex, and the product thus obtained is known as "Sernamby." This product is gained in the form of threads without the aid of acids or other chemical substances.

The method of operating is as follows: This channel of sheet iron, with the above described mechanism and receptacles, is fastened against the rubber trees. If it is a small tree there will be two of these devices; if it is a large tree, there may be as many as nine circling the tree and about a hand span apart. This apparatus is connected by an insulated wire with a central station which is equipped with electric power. A machine devised by the inventor makes it possible to send the electric current so that it will set the first section in motion. The latex then oozes out and flows into the receptacle immediately beneath. In the receptacle there is an acid preparation that coagulates the latex, converting it into rubber. The next day or preferably forty-eight hours later, the current is turned on again affecting the second section, which in turn pricks the tree, bringing forth the latex, which drips into the second cup and is there similarly coagulated. After another interval of two days, the third section is set in motion, and so on for the fifteen to thirty sections, which are operated from the central station, tapping the tree and filling the receptacles with rubber. It is not necessary to examine the tree until the expiration of sixty days, when a handful of rubber will

be found in each of the receptacles, and on a large tree when there are none of these devices—each with thirty cups—there will be 270 lumps of coagulated rubber waiting for the gatherer. It is stated that the same current that does the work on one tree can do the work on 5000 trees by simply equipping that number of trees and connecting by the insulated wire, so that the electric current can be communicated. In an actual test already made, between fifty and sixty trees have been tapped at one time from the central station.

According to Mr. von Hassel, the advantages are as follows: First, the enormous saving of labor, one man being able to do the work of forty under the old system; secondly, the power to tap trees in the swamps which cannot often be approached by the tapper; third, the fact that the trees can by this process be tapped very early in the morning before the sun is up, when the latex flows more freely; and, fourth, the fact that the trees cannot be injured by this process, as the punctures are very small and heal rapidly.—*H. and C. Mail.*

POPULARITY OF BANANA FOOD PRODUCTS.

By O. W. BARRETT, in *Philippine Agricultural Review*.

After a decade or more of partially successful experiments in the manufacture and popularization of banana products, a definite market is now assured, at least in Europe, and we may expect to hear of numerous factories being established throughout tropical America and, let us hope, even in the Philippines, within the next few years.

Jamaica, in the West Indies, has been the mother, so to speak, of this industry and it is in that island where nearly all of the really important factories for handling bananas are now to be found. In the March, 1912, number of *The Philippine Agricultural Review* attention was called to the appearance on the market of several varieties of banana products; it seems, however, that recently several additional companies have entered into the business in Jamaica. From the Daily Consular and Trade Reports we learn that at least six factories are now in operation and two other companies are contemplating the erection of large plants.

The following quotation taken from the above-mentioned publication indicates clearly the present status of the business: the processes in use in the various concerns are, of course, more or less private, though for that matter Philippine conditions would necessitate the working out of special methods for handling the material here:

"The original factory, which has been operating about six years at Gayle, claims to have a secret process for making banana figs. A large factory at Montego Bay had its machinery made after

its own designs in New York. Two other companies expect to patent their machines, which have been locally designed and manufactured. It is understood that the drying is done by hot air and that it takes 400 to 500 pounds of fruit to make 100 pounds of the figs. For a good many years experiments have been made in drying bananas, but it has been difficult to find a process for making a product that would keep well. Now that manufacturers are using a variety of machines and apparatus it is to be expected that the best process will soon be known. Although worms are never found in ripe bananas, the preserved fruit, if left exposed, attracts insects and soon becomes infested with small worms, as is the case also with other dried fruits.

"The food products manufactured are fig bananas or banana figs, cooking bananas, banana chips, flour, and meal. All the factories dry or evaporate the bananas whole without the addition of sugar, and yet they are sweet and palatable, like pressed figs, which they also resemble in color. At least one factory cuts the bananas into short pieces before drying or evaporating them, thus making a product that looks much like the dried figs of commerce. It seems that it would be well in order to make a distinction to call the bananas cut into pieces 'banana figs' and those treated whole 'fig bananas.' What are known as 'cooking bananas' are so thoroughly dried as to be hard, the color of these being almost white. Broken into pieces they form 'banana chips,' which not meeting with duties are imported to be ground into meal or flour in the country of consumption. In spite of the fact that the meal is said not to keep well, one Jamaica factory uses an American gristmill for grinding the chips. Another company has its own factory in London, to which it exports the chips to be ground into flour and meal and made into other preparations for market. A small booklet is issued there to set forth the dietetic value of banana foods as attested by British and German food experts and others; and there is added a list of products on sale, with recipes for their use, etc. These banana food products have been awarded many prizes, diplomas, and certificates of merit.

"It seems that all banana food products are wholesome and nutritious. The figs are delicious and are likely to be preferred to real figs by many persons. The fig bananas cut into small pieces may be used like raisins to impart an additional flavor to cakes and puddings. The chips, after being well pounded or ground in a coffee or other hand mill, may be boiled and then used as an excellent breakfast food or for making delicious puddings. Gruel, porridge, and other preparations made from banana flour and meal, which are rich in easily soluble carbohydrates, are recommended for infants, invalids, and dyspeptics. The negro women of Jamaica use banana meal gruel as a substitute for milk for their infant children. The banana itself is one of the most wholesome and nutritious of fruits if eaten slowly when it is perfectly ripe (that is, just before it decays), but not when devoured only

half ripe, as is often the case in the United States, which causes many persons to regard bananas as being difficult to digest.

"It seems only necessary to make the value of banana food products known in order to create a large market for them. Already they are to a considerable extent popular in Germany and Great Britain, which have been taking the bulk of the exports of such products from Jamaica. * * * The Hawaiian Islands and the Philippines also seem to offer inviting fields for the profitable manufacture and exportation of banana food products."

An interesting feature in the comparative progressiveness of Europe and America in the line of adopting new foods, etc., is brought out in the statement that a large United States order was recently refused by one of the Jamaica companies by reason that it was under contract for shipment to Europe of practically its entire output. It seems that the combined capacity of the Jamaica factories is only some three tons per day, but this will probably be considerably increased in the near future.

The writer remembers with pleasure testing both at Key West, Florida, and Washington, D. C., a series of samples of banana products made by a Central American firm; moreover, he made numerous experiments (extending even to table tests) at the Porto Rican Experiment Station in the line of flours, meals, and coffees, from numerous varieties of bananas and plantains grown in that island; in Porto Rico, however, the only form of banana food in general use aside from the fresh fruits is a plantain flour from which a most wholesome gruel for invalids is prepared.

In short, then, we should remember that banana products can be very cheaply grown in the Philippines; that these foods may be very conveniently and safely stored, transported, and exported; that they are of very high nutritive value; and therefore that they can not be overlooked in any study of the social economics of these Islands. In short, the banana as a crop not only helps out very materially the precarious old one-crop system but also provides a very interesting subject for study by the future manufacturers and merchants in the Orient.

THE DANGER OF INFECTION FROM TUBERCULOUS MILK.

Medical men and veterinarians have for many years been in accord in urging the necessity for the adoption of strong measures to keep in check, and eventually get rid of, the plague of tuberculosis; and a paper read by Dr. Sheridan Delépine a short time ago, at the conference of the National Association for the Prevention of Consumption, can well be brought to the notice of our readers in the same column as the recently issued report (for 1911) of the veterinary surgeon of the Corporation of Glasgow.

Dr. Delépine took as the title of his paper, "The Share Taken by Human and Bovine Tuberculous Products in the Infection of Young Children," and his final statement demonstrates very emphatically the necessity for the systematic and proper inspection of dairy cattle, for he states at the conclusion of his paper, "Taking all these things into consideration, I think it is possible to say, without fear of exaggeration, that not less than 25 per cent. of the tuberculous children under 5 years of age suffer from infection of bovine origin, and that this estimate is much lower than one based on probabilities would be." Earlier in his paper we read the gratifying statement that "as a result of the work done in Manchester during the last fourteen years the amount of tuberculous milk supplied to the town has been reduced to about one-third of what it was originally, and its infectivity has also been reduced to a very considerable degree." This statement is a great tribute to the work done by Dr. J. Niven and his veterinary officials, and the example of the Manchester Corporation in this direction might with advantage be followed by other cities, if parliament is still going to delay some form of general legislation on milk questions, and leave municipalities to use what local powers they can obtain in various manners. The extensive prevalence of tuberculosis in cattle and in that other animal, the pig, which feeds so largely during a certain portion of its life upon milk, is constantly brought into prominence by abattoir statistics, and those of Glasgow carefully compiled in the veterinary report of Mr. Trotter show no exception to the rule. Mr. Trotter commences his report by the statement that "The most frequent disease affecting home animals is tuberculosis," and states that out of 71,745 British cattle slaughtered no less than 8932, or 12.44 per cent., proved to be tuberculous. Of these, 1398, or 15.65 per cent., of the carcasses were so badly affected that they had to be destroyed. Of the pigs, out of 44,643 animals slaughtered, 3740, or 8.37 per cent., were tuberculous, 91, or 2.32 per cent. of the carcasses, having to be totally destroyed. He calls attention to the crying necessity for enforced legislation in connection with the inspection of dairy cows and the sale of milk, and states that a comparison of the number of cows in Scotland with the number of cows removed under the order shows that, whilst a few authorities are doing their utmost to prevent the sale of milk drawn from animals affected with tuberculosis of the udder, there are a great many other authorities who are doing absolutely nothing. He points out how defective the "milk" clauses of the Burgh Police Act are in that they "do not compel the dairyman to notify all cases of udder disease, do not insist upon the examination of all cows being carried out by veterinary surgeons, and do not empower the local authority to slaughter useless animals." Of the prevalence of tuberculosis amongst milch cattle, further evidence was shown by the fact that of ninety-eight cows tested with tuberculin before being admitted to the herds from which

milk is supplied to the fever hospitals no less than forty were rejected, thirty of them being positive and the other ten doubtful reactions—truly an alarming proportion when we consider that these would all be good-looking beasts which had received the critical attention of the dairy owner beforehand in the full knowledge that they were to be tested. The danger is not, of course, that all the reacting animals give infective milk, but that such a degree of prevalence of tuberculosis must mean the presence of a high proportion of dangerously infected animals in our herds. It is now five years since the Commission on Tuberculosis reported that "cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis, in man." Neither the Board of Agriculture nor the Local Government Board has been sufficiently active in the matter, but we note with pleasure that Mr. John Burns has given notice of the introduction of a new milk bill into the House of Commons.—*The Lancet*.

MEDICINAL AND OTHER PROPERTIES OF THE PAPAW (PAPAYA).

The milky juice of the unripe fruit of the papaw tree is admitted by high medical authorities to be an efficient vermifuge, and a similar property is possessed by the seeds, which have a pleasant flavor resembling that of cress. The juice is also a good cosmetic, which is used for the removal of freckles. But the most remarkable thing connected with the papaw tree is property possessed by the milky juice of the unripe fruit of separating the fibers of flesh and making it tender. The late L. A. Bernays, who was undoubtedly a reliable authority on the properties of plants and fruits, says, in his valuable work on "The Cultural Industries of Queensland," that this property is not confined to the juice of the fruit, but the very exhalations of the tree are said to possess it; and of this fact the Brazilian butchers take advantage to make their toughest meat saleable. This is accomplished by suspending the newly-killed meat in the tree, or by wrapping it in the leaves. So powerful is this softening action of the juice that it must be used with caution, or the meat will drop to pieces, which makes it more unpalatable than if left in its original condition of toughness.

Some interesting experiments were made some years ago upon this subject at the Royal Agricultural Museum, Berlin. A portion of the juice was dissolved in three times its weight of water, and this was placed with 15 lb. of quite fresh, lean beef in one piece in distilled water, and boiled for 5 minutes. Below the boiling point, the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. The juice can be dried without losing its effect, but its efficiency in this respect does not appear to have been tested over a longer period

than six months. For roasting or baking, the best method is to wrap the meat in some of the leaves; and for boiling, to add to the water some of the expressed juice or a piece of unripe fruit. The exact proportion to be used, and the time to be employed to render meat tender without softening it too much, can only be learned by experience; but in a hot country, where meat is necessarily cooked so soon after killing, a method by which it may with certainty be served tender, without detriment to its flavor or wholesomeness, is worth taking some trouble to determine. There can be no doubt concerning this property of the papaw juice and leaves, for we have frequently rubbed tough beefsteak with the milk of the unripe fruit with the result that the meat could be pulled to pieces with a fork on the following morning. The milk has a remarkable effect in eradicating corns and warts. A decoction of the leaves is a wholesome medicine in internal fevers. The dried leaves mixed and smoked with tobacco, or alone, afford great relief in cases of asthma. For dysentery the ripe fruit is a sovereign remedy.—*Tropical Agriculturist*.

HOW TO MAKE A SCHOOL GARDEN.

The following interesting article contributed by Mr. C. A. Barber to the "Madras Agricultural Calendar," is reproduced in *The Journal of the Board of Agriculture of British Guiana*. Every elementary school should have its garden. It is, of course, important for children to learn to read and write and to do simple sums, but other things are necessary to equip them for life, especially in those cases where the mass of the population is devoted to agriculture. They must be taught to observe; not only to see things, but to understand what they see. The school garden, if properly managed, is one of the best means of training children in this way. There is yet another way in which the school garden may be useful. If the children are taught to do work themselves, they will be taught to do things, not merely to know how to do them. The school garden, then, may be used to train children in observing, in reasoning, and in the capacity for doing things for themselves, all very important matters in after life. They can also be taught to be neat and methodical by making them keep the place neat and tidy.

The main line of work should be to learn all about the way plants grow. Plants should be reared and examined at all stages from the bursting seed to the flowering and fruiting stages. The sowing of seeds in pans should be taught, with the necessary protection against the sun, wind and rain. The seedlings when very tiny should be pricked out into smooth beds so as to leave just room for them to expand and make a few leaves. Then they should be lifted, each with a ball of earth around its roots, and

put into the place for which they are intended. Beds should be formed with good gravelled paths between. The beds should not be too wide; every plant should be easily reached from a path, because all treading on the beds should be carefully avoided. Flowers want a good deal of sun, but foliage plants will require some sort of shade. Shrubs should be planted round the outer part of the garden or here and there in the middle if there is plenty of room. Trees should be kept outside as much as possible, for their roots interfere with the beds. By this means you will have the brightly colored flowers in the middle open space, foliage plants nearer the edges, and shrubs and trees forming the background. If possible a small patch of grass lawn should be added to set off the flowers, but it must be kept free from all weeds.

A careful plan of the garden must be made showing all its paths and beds, and this should be filled up with the plants growing in it every season. The children should be made to take part in every kind of planting. They should be taught to weed the beds and keep the paths clean. All weeds and leaves, loppings from the trees and garden rubbish should be put into a pit in a hidden corner with a layer of earth spread over every now and then. This weed pit is a most useful adjunct to a garden and when the weeds are well rotted and their seeds destroyed, the leaf-mould obtained from it may be useful for potting plants or in improving the soil.

As great a variety of plants as possible should be aimed at; for each will show something of interest and the children will learn something of the infinite variety of Nature. The teacher will find it much easier, where there are many kinds of plants growing, to select just those for class work which are suited to the lesson of the day. By a well-arranged school garden every part of a plant's life may be illustrated, the use of each organ, the causes of health and disease, animal and vegetable pests (which will always be present), the effect of the sun and light, wind and shade, watering and drought.

FERTILIZATION OF TROPICAL CROPS.

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"It is probably not realized, even by those who are directly

concerned, how little real attention is devoted to this all-important question.

"In temperate climes the interest in the subject is increasing by leaps and bounds as the ever-growing demand for food-stuffs makes it imperative that the soil should be made to produce to its utmost capacity."

Pointing out that the future supply of food for the world's consumption will soon become a pressing one, as population increases and new fields for cultivation become fewer and fewer, the article proceeds in part as follows:

"In tropical countries, with a few exceptions such as Java, Ceylon and Hawaii, the importance of getting the maximum yield from the soil does not seem to be realized, or, if it is, little attempt is made towards accomplishing it. It is almost impossible to calculate the annual loss to the cultivator, and therefore to the whole community, which arises from either ignorance of fertilizing methods or careless disregard of them.

"Take the case of India, or of Mexico, or the coffee lands of Brazil and the Central American States. It would be safe to say that the crops generally could be doubled and even trebled in those countries, on the area now under cultivation.

"In India, where the Government is now devoting much time and money towards the improvement of agriculture, nearly one million tons of sugar have to be imported yearly. And yet probably over two million tons are produced in the country. It is said that the average yield of sugar per acre in India is less than half a ton, while the average is not much better in Cuba, where also some two million tons of sugar are produced per annum. Compare this with the average yield in the Sandwich Islands, where the utmost care is given to the question of fertilizing, with the result that an average yield of nearly five tons of sugar per acre is secured. Quite apart from good management and cultivation, which may do much, it is admitted that this splendid result is mainly due to carefully thought out fertilization. And it must be remembered that similar results are obtained, not in one year only but every year, by systematically replacing the plant foods which are removed by the crop. Making all allowances for any climatic advantages Hawaii may possess, there is surely no reason why India and Cuba should not at least double their sugar production on the land at present under cane. Even so, the yield would only be one-fifth of that of the Sandwich Islands.

"The sugar crop is only taken as an example because of the extraordinary difference in yield shown between a highly fertilized crop, as in Hawaii, and the practically unfertilized crops in India and Cuba. The position is much the same with all crops in the tropics. The wheat crop is, perhaps, the most

important, and there is no question that much of the immediate anxiety about the world's food supply would be allayed if the vast area under wheat in tropical and sub-tropical countries were so treated as to produce something approaching its real capacity.

"The problem is not an easy one, for in many cases the supply of pen manure is nothing like sufficient for the needs of the crop, and it may be thought that the cost of artificials would often be such as to prohibit their use, at any rate with profit to the grower. As a matter of fact, this would not be the case, except in isolated instances, and the grower must be taught the value of these (so-called) artificial plant foods. There are but few places in the world in these days where a demand for such commodities would not be met with a supply. The difficulty is that the grower—be he European or native—is, as a rule, reluctant to make an outlay on manures; and it is only after months, sometimes years of patient instruction and demonstration, that the expert's teaching bears fruit.

* * * * *

"We have observed with much interest the great strides made in Egypt in this direction during the past few years, as evidenced by the largely increased imports of phosphatic and nitrogenous fertilizers since 1908. In that year, for instance, the import of nitrate of soda was 15,000 tons, while in 1912 the figures had risen to over 56,000 tons. This only shows what can be done, even with the conservative native cultivators, if only practical steps are taken to educate them; and though the way may sometimes be long and the difficulties great, we have proof in these figures that the thing is not only possible, but can be successfully accomplished."

COMMERCIAL BIRD BREEDING.

Readers of the Forester are aware that the Board of Agriculture and Forestry has given much attention, in recent years, to the question of the importation of birds to these islands which might be assured to be beneficial with respect to their selection of insect and grub pests for food, and not liable to change their habits so as themselves to become nuisances—which would be nothing new. Lately the question of the introduction of strange birds has become a popular topic of discussion, in connection with the arrival of a bird fancier from Australia with a considerable stock of members of curious feathered tribes, together with the fact that the municipality of Honolulu has a special fund, from hunting

license fees, for the purchase of game birds to turn loose in field and wood.

In view of these things, it will be interesting to give some account of a controversy, or at least a discussion from opposite view-points, now going on in England between traders in plumage and those who are anxious to save from extermination the many beautiful feathered creatures that are killed for the sake of their plumage. Of course, no one here is directly interested on either side of the contest, but, in the matter of diversified industries, there is an attractive phase of the matter to local people in the suggestion of solving the problem through the breeding of birds valuable for their plumage, especially as a few people here have gone into the raising of foreign varieties of pheasants and other fancy bird stock.

Two joint correspondents of *Tropical Life*, in the March number of that magazine, refer to efforts being made by the bird protectionists to induce the British government to prohibit absolutely the importation into the United Kingdom of the plumage of practically all birds save that of the ostrich and those of which the flesh is eaten as food. They say:

"So far as we can see there is not the slightest chance that any bill prohibiting the import of plumage will become law. Even if such an act were placed on the Statute book, the benefit to the birds would be small unless either similar enactments were passed in all European countries and in the United States of America or laws were passed prohibiting the export of plumage from the various tropical and sub-tropical countries in which the feather-yielding birds occur. Those who have followed the controversy know well that there is not the least likelihood of the other European countries passing acts prohibiting the import of plumage."

TROPICAL AGRICULTURAL UNIVERSITY.

Mention has been made in previous numbers of the *Forester* regarding an agitation throughout British tropical dominions for the establishment of a tropical agricultural university. Both the agricultural press of London and of colonies wide apart have been discussing the subject for some years past. The *Forester*, on different occasions, has put forth the suggestion that the College of Hawaii should be advertised in British tropical countries and their motherland as an institution possessing at least the basic conditions which it is urged a tropical university should have. It has the nucleus of an efficient faculty, abundant material for purposes of teaching and study, the right environment—while in location it offers perhaps as moderate a cost of maintenance in

civilized associations to students as any other place equally suitable in technical requirements.

The following extracts from an article in the *Agricultural News*, a journal that often of late has agitated the question, at once describes what the British tropical agriculturists are wanting and what the College of Hawaii is now fairly ready to offer in the way of teaching of tropical agriculture, both in the abstract and the concrete:

"All the West Indian colonies now possess local departments of agriculture with their experiment stations: there is little prospect, however, of these becoming so equipped as to warrant their undertaking abstract investigations in agricultural subjects: their functions are likely to be limited more or less to problems of a concrete and more immediately practical character. A university of tropical agriculture would tend to strengthen and develop the work of the local agricultural departments, and could in no sense be regarded as displacing them or reducing their work and activities, for it could undertake useful investigations of a more abstract character than are appropriate to experiment stations—so that there would arise a useful distribution of work of investigation and coöperation between existing institutions and the one now contemplated.

"As an outcome of its centralizing influence a tropical university would play an important part in acting as a means for accumulating and storing knowledge relating to tropical agriculture ready to be drawn upon by workers in its neighborhood and even over a wider range; it would also serve as a centre where knowledge and ideas would be grouped and coördinated so as to permit of the production of well considered views relating to various industries—an idea which found expression in the letter addressed to *The Times* by Mr. John W. McConnel in which he pointed out how such an institution might materially advance the interests of cotton-growing by assisting to formulate knowledge for the guidance of those who are endeavoring to push cotton-growing into new districts; and we may add it would serve to train men who would be qualified to carry these ideas into practice after having acquired experience in their application. The same ideas may be employed in regard to many other industries than cotton: cacao, rubber, oils, fruits, spices, and many others present their special unsolved problems which await the students and investigators who, it is reasonable to conceive, would soon group themselves around a tropical university."

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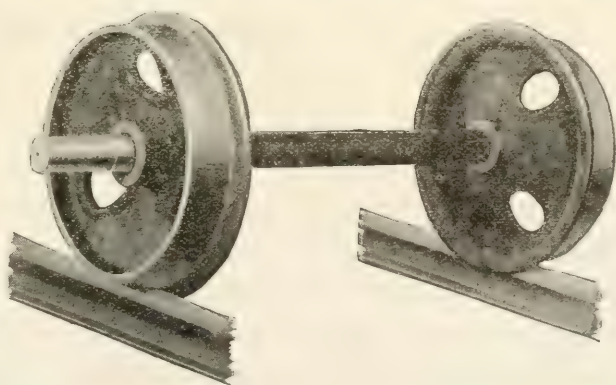
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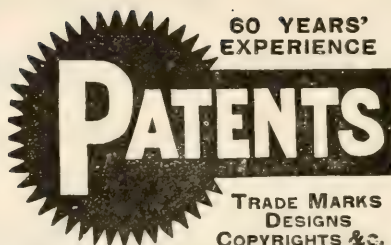
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RALPH S. HOSMER,
Superintendent of Forestry.

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EDW. M. EHRHORN,
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COMMERCIAL BIRD-BREEDING.

(For the beginning of this article, see the April number. What follows here was inadvertently cut off without a continuation line.)

To meet the difficulties of the problem the correspondents advocate bird-farming, also a commission to take evidence with a view to ascertaining the extent to which the trade in the skins and feathers of birds may be carried on consistently with the maintaining of the numbers of the birds affected. As to regulation and breeding they present the following arguments:

"In the case of such polygamous birds as the monal or Impeyan pheasant (*Lophophorus refulgens*) it is well known that a judicious thinning out of the cocks is beneficial to the species, because the unmated cocks worry the hens and interfere with their breeding arrangements. As the trade require only the skins of the cocks it is obvious that numbers of these can be supplied in places where the birds are numerous without reducing the numbers of the birds.

"This is not mere conjecture. The experiment has been tried and has proved successful. Moreover, pea-fowl and the various pheasants can be farmed. Pea-chicks are reared in the Zoological Gardens at Lahore by hatching the eggs in an incubator and giving over the young birds to the care of the barndoor hen.

"An enormous trade is carried on in the nuptial plumes of some species of egret. These plumes are known in commerce as 'ospreys.' There is no reason of which we are aware why egret farming should not prove as profitable as ostrich farming.

"Moreover, since Egrets nest in large colonies it should be possible, with proper management, to remove the nuptial plumes from wild birds without harming them. Some of the birds of which the plumage is largely imported, notably the Indian paroquets (*Palaeornis*), are very destructive to the cereal crops. In some parts of India these paroquets are so numerous as to be a scourge to the cultivator. In such localities the paroquets might, with advantage, be judiciously weeded out."

The correspondents mention that the government of France last March stated that it had no intention of prohibiting the import of plumage into that country, "because such a prohibition would have the effect of causing very great loss to an industry which supports a French working-class population of at least 50,000 persons and involves a turnover of more

than 100 million francs. It is equally certain that export will not be prohibited from the countries whence the feathers come." Referring to the prohibition of the export of plumage from India, the writers say that it is to a large extent nugatory on account of the ease with which egret can be smuggled. "Thus the birds are being slowly but surely exterminated," say the writers, "while the traders and protectionists are fighting one another. This is coming to pass in spite of the fact that both sides are, or ought to be, anxious to prevent the extermination of the birds."

Harold Hamel Smith, editor of *Tropical Life*, prints a reply he had sent to the correspondents above quoted. He states that in an Anglo-tropical journal "a section specially devoted to economic zoology is striving to show how important bird-breeding industries can be established in tropical and other centers, at many of which the climatic conditions would allow of their being carried on by English families. Such establishments could breed the different varieties of egrets, pheasants, game birds, ducks, pea-fowl, and many other birds, not only to ship the plumes of varieties now known to ornithologists and the trade, but by careful and scientific cross-breeding and 'Luther Burbanking' the birds, to evolve new colors and effects, so as to feed our trade novelties at present unknown, and so cause the fashions to change for more often than they have done of late, thereby giving each particular strain time to recover. Many of these crosses would probably not breed; so far from reducing the birds, the trade would alone be the means of increasing the numbers and varieties. I am told some striking effects have already been obtained by crossing Javanese and Indian pea-fowl, as can be seen in the section devoted to hybrid at the Natural History Museum, South Kensington; also by such crosses as the Golden and Lady Amherst pheasants. In this case the hybrid, being fertile, can be propagated to any extent, instead of having to be rebred each time.

"At the end of September I went specially over to Paris to make inquiries into the matter, and, with M. Amédée, son of the founder of the *Revue Britannique*, visited the Jardin d'Acclimatation to see the birds and animals there and to discuss the subject of cross-breeding birds. Of the animals, I was principally concerned with the guanaco, llama, and vicunas, some of which seem likely to become dangerously scarce unless prompt attention be given to their preservation, in which case I believe important industries could be established. Since my return I have written an article on the guanaco, which is shortly to be published. I wonder how many of the opponents of the bird-millinery trade have troubled themselves about this animal.

"With what I have learnt in Paris and London, coupled with

my own (now nearly thirty years) experience of the tropics and its birds, I am certain that if it is *only* extermination that is feared, the whole controversy can be ended, and both sides brought together to prevent this, in a very short time. I therefore appeal through your columns to the head of the India office and to the secretary of state for the colonies, and others who believe in keeping this important trade for England, especially London—once there is no fear of the birds being exterminated or becoming even scarce—to bring about a meeting, without including the ultra-humanitarians and the faddists (who have already had more than their share of attention), to hear what practical men, and those who have had long experience in the matter, have to say.”

A FENCE POST TEST.

The following letter to the Superintendent of Forestry, which explains itself, is believed to be of sufficient general interest to make it worthy of being put on record. The posts were cut from trees grown in the Tantalus forest, felled during the winter of 1910. They were allowed to season by air drying for several months prior to their being put in the ground. Further examinations of these posts, in later years, should yield additional information as to the lasting qualities of this wood.

The College of Hawaii, Honolulu, Hawaii, April 26, 1913.

Mr. Ralph S. Hosmer, Superintendent of Forestry, Board of Agriculture and Forestry, Honolulu.

Dear Mr. Hosmer:—Complying with your recent verbal request for a report on the condition of the *Eucalyptus cornuta* fence posts which are under test at the College Farm in Manoa, I beg to report on same as follows:

Charred Posts—Average decay 6 inches to 12 inches below surface of ground, $\frac{1}{4}$ inch to $\frac{1}{2}$ inch.

Tarred Posts—Average decay 6 inches to 12 inches below surface of ground, 0 inch to $\frac{1}{4}$ inch.

Creosoted Posts—Average decay 6 inches to 12 inches below surface of ground, no decay.

Posts Set in Concrete (not treated)—Average decay 6 inches to 12 inches below surface of ground, $\frac{1}{2}$ inch to 1 inch.

Untreated posts—Average decay 6 inches to 12 inches below surface of ground, $\frac{1}{4}$ inch to $\frac{3}{4}$ inch.

From the above it will be noted that the creosoted posts were found to be in the best state of preservation. The second best preserved posts were those that were tarred. The charred posts showed about the same amount of decay as the untreated posts, so that it is assumed that the charring had but little or no value as a preservative.

The posts set in concrete showed by far the greatest amount

of decay. In fact, to the depth of a half inch or more the decayed matter was quite soggy, and in one case a luxuriant fungus growth appeared at the surface of the ground where the concrete began.

It is quite plain that the concrete tends to hold moisture at the surface of the post, thus hastening decay. From this experiment, which is now under way two years, it is plain that the creosoting and tarring of the posts are the only treatments worth considering, and of these two I would recommend creosoting as the best and most practical.

In every case the greatest amount of decay was noted where posts were set in wet ground, as was, of course, to be expected. Where posts were surrounded by stone which permitted the moisture to dissipate freely, all posts of whatever treatment were in a fair state of preservation.

All of the posts reported upon in the above had their bark removed before setting. This practice is to be highly recommended. Posts not so treated were more or less affected by borers and presented a bad appearance generally.

It was further noted that wherever the posts checked badly, especially at the top, the work of borers was active. I would suggest that it might be a good plan to dip the ends of all posts in tar to prevent excessive checking.

The cost of dipping the posts three feet in creosote was about 12½c each; the cost of dipping in hot tar is a little less, say about 10c.

The cost of peeling off the bark when posts are green is about .5c each.

Trusting that these data may be of some practical value, I am,

Very truly yours,

F. G. KRAUSS,
Professor of Agronomy.

NEXT RUBBER EXHIBITION.

In this number will be found an article from the Rubber World Supplement on the international rubber exhibition in London in 1914, for which, with other data on the subject, the Forester is indebted to Mr. Wilbur A. Anderson, secretary of the Hawaiian Rubber Growers' Association. Mr. Anderson is a member of the advisory committee of the London exhibition, of which King George is patron and Sir Henry A. Blake, G. C. M. G., president. Medals are offered for the best Ceara rubber, the best sisal hemp and the best Robusta coffee, all of which might have an interest for Hawaii. In forwarding the material referred to, Mr. Anderson, writing on May 2, says:

"Allow me to express my appreciation of your editorial in the last Forester concerning the 1914 Rubber and Tropical Products Exposition. I heartily agree with your views concerning the wisdom of the Territory doing something to help the smaller agricultural enterprises in making a creditable exhibit. It would seem that, with the present hard outlook for sugar, it behooves us, besides complaining of our hardships in this line, to make even more strenuous efforts than ever before to establish our minor industries, and to consider the possibilities that might lie in substituting some of these other crops for sugar on the poorer sugar plantations, which must inevitably give up raising sugar, if the worst we fear should come.

"I presume, in view of the hard times anticipated, and the expense of the Panama Exposition, we can hardly expect the present legislature to adopt your suggestion, but you have given them the opportunity, anyway, and your part is done."

An article reproduced elsewhere from *Tropical Life* for April, on the subject of coconut estates and army remounts, under the department head of "Economic Zoölogy," contains matter that might be worthy of study in Hawaii.

Interesting matter on dry farming in the tropics, contained in a book review, appears in this number.

THE VARIATION IN THE QUALITY OF RICE.

By C. K. McCLELLAND.

Before taking up directly the factors causing variation in the quality of rice it may be well to review some of the experimental work relating to the influence of various factors upon the quality of grains in general. Primarily by a difference in quality, we mean a difference in the chemical composition. In some grains a difference in composition may be easily detected by the eye. In corn, for example, the practiced eye can tell the variations in the content of oil, carbohydrates, or protein. In wheat, the differences are not so strongly marked, but it is easy to distinguish between the hard, glutenous wheats and the soft, starchy ones. More experimental work has been done upon wheat than upon other grains and the results show that various conditions of environments are the main factors causing variation.

It has been found that:

1. There is a difference in varieties in their composition. However, the composition of the seed does not always determine that of the product, since other factors may overrule the varietal.
2. The application of fertilizing ingredients to the soil slightly increases the per cent. of those ingredients in the crop.

3. A higher protein content is obtained when plants are grown in the shade than when in the light.
4. Ditto, when there has been a limited amount of water.
5. Ditto, when the growing period is short, than when it is long.
6. Ditto, when there is a high temperature at the time of maturing.
7. Ditto, when the season of ripening following the blooming has been short—this factor being dependent upon the variety, the supply of moisture and the temperature.

With sugar beets it has been found possible to greatly increase the sugar content by selection. In corn also the content of fat, carbohydrates or of protein has been increased by selection along the proper lines. With wheat, selection has not been so uniformly successful, since climatic factors have been found to influence the composition more than all other factors combined.

In Bulletin 128 of the Bureau of Chemistry of the Department of Agriculture we learn—

| | | |
|---|--------|------------|
| That Crimean wheat grown in Kansas in 1905 had..... | 16.22% | of protein |
| When grown in Kansas in 1906 from Kansas seed..... | 19.13% | of protein |
| When grown in Kansas in 1907 from Kansas seed..... | 22.23% | of protein |
| When grown in Kansas in 1907 from California seed.... | 22.23% | of protein |
| When grown in Kansas in 1907 from Texas seed..... | 22.81% | of protein |
| When grown in Kansas in 1908 from Kansas seed..... | 14.70% | of protein |
| When grown in Kansas in 1908 from Texas seed..... | 14.77% | of protein |
| When grown in California, 1906, from Kansas seed..... | 10.38% | of protein |
| When grown in California, 1907, from Kansas seed..... | 11.00% | of protein |
| When grown in California, 1907, from California seed... | 11.33% | of protein |
| When grown in California, 1907, from Texas seed..... | 11.37% | of protein |
| When grown in California, 1908, from Kansas seed..... | 11.52% | of protein |
| When grown in California, 1908, from California seed... | 11.75% | of protein |
| When grown in California, 1908, from Texas seed..... | 12.44% | of protein |
| When grown in California, 1909, from Kansas seed..... | 12.11% | of protein |
| When grown in California, 1909, from California seed... | 13.27% | of protein |
| When grown in California, 1909, from California seed..... | | |

By comparing the results in Kansas and California and remembering that the seed used in any one year was that produced in the year preceding, it will be seen that the composition of the seed used seemed to affect the resulting crop not at all; that seed rich or poor in protein when planted in Kansas produced, in any one season, grain of equal quality, but always richer than when the same seed was planted in California.

Also, it will be noticed that there was a variation in the composition in a given place, upon the same soil in different seasons.

The variation in Kansas was from 16.22 to 22 per cent., while in California the range was from 10.38 to 13.27 per cent.

Great variation was shown also in the weight of 1000 grains and in weight per bushel. California Crimean wheat with 64 per cent. of starchy grains, when grown in Kansas produced 100 per cent. flinty. The California experiment station then took the next step, and to eliminate the effect of climate, brought soil from Kansas to California; seed produced upon this soil was also brought along to use in the experiment. Turkey Red Wheat, a hard winter wheat, as grown in Kansas in 1907 had 20.06 per cent. of protein. When grown in California—

| | | |
|--|--------|------------|
| On Kansas soil in 1908 it had..... | 18.02% | of protein |
| On California soil in 1908 it had..... | 18.29% | of protein |
| On California soil in 1909 it had..... | 15.07% | of protein |
| On Kansas soil in 1909 it had..... | 14.32% | of protein |

The results show that when placed under the California climate, the Kansas soil had absolutely no effect upon the protein content of the crop, which was a further proof to that already obtained in Kansas in different seasons. This high protein wheat lost in protein content when grown in California, and a similar test of a low protein wheat resulted in a uniform increase in the protein upon both the Kansas and the California soils. So that it is sufficiently worked out that the climate is the chief factor in affecting the protein content of wheat.

It is, of course, acknowledged that wheats rich in protein are desirable as being more nutritious; and furthermore the protein content has an appreciable effect upon the baking quality. Utah Bulletin No. 72 says: "No matter what other factors may contribute towards quality in bread, that most desirable property known as 'lightness' depends primarily upon adequate amounts of gluten * * * and that a definite relationship exists between the crude protein content of wheat and the crude protein and gluten content of flour * * *."

From all of the above it is seen how climate, being the chief factor in influencing the composition of wheat, has thereby a considerable influence upon the baking qualities of the flour and in the quality of the resulting bread, although it is acknowledged that slight variations in protein content of the wheat can not be detected in the bread.

Now, when we take up the factors influencing the quality of rice we find we have a similar but a somewhat different proposition in that, while climate may change the quality in one sense of the word, yet no difference in the chemical composition can be found. In the annual report of the Hawaiian experiment station for 1909 will be found the following analyses:

| | By the Exp. Station at Honolulu. | | By the Bureau of Chemistry at Washington, D. C. | |
|--------------------------|-------------------------------------|------|---|------|
| | % protein. | Fat. | Protein. | Fat. |
| Unpolished rice: | | | | |
| Imported Japanese rice.. | 7.09 | 2.08 | 7.19 | 2.08 |
| Hawn.-grown Jap. rice.. | 6.79 | 2.10 | 7.38 | 2.23 |
| Hawn.-grown Gold Seed.. | 7.14 | 2.13 | ... | ... |
| Polished rice: | | | | |
| Imported Japanese rice.. | 6.39 | .64 | 6.63 | .38 |
| Hawn.-grown Jap. rice.. | 6.47 | .71 | 7.31 | .58 |
| Hawn.-grown Gold Seed.. | 6.78 | .46 | ... | ... |

The table shows that there is no chemical difference between the Japan variety or the Gold Seed, nor between the Japan variety when grown in Japan or in Hawaii. Yet the fact remains that there is a great difference in quality between these rices. To the American people who eat rice with milk and sugar, with gravies, with curry, in custards or in other ways, all kinds of rice taste pretty much alike, and because it is rice we think that if we eat it once in a week or a month, that is all we want of it. The taste of the Chinese for rice is one that is fixed by custom, and the same is true for the Japanese, with the difference that the latter people are more discriminating in their taste and will, if they are able, buy only rice that pleases them, while the Chinese will be contented with whatever rice happens to be the cheapest. The Chinese have been accustomed for generations to the rice which has a long, narrow kernel and which may be described as a dry rice, while the Japanese have been accustomed to the short, thick berry of what has been termed a glutenous rice but in which analyses, as shown, fail to find any extra amount of glutenous material.

A similar peculiarity of taste is shown by the fact that most Southern people prefer a soft, sugary sweet potato, while the Northern people who are accustomed to dry, mealy Irish potatoes show a preference for sweet potatoes of like description. The Chinese and Japanese, moreover, consume large amounts of rice and they eat it for the most part alone, without any of the fixings which the Americans commonly use.

When the Japanese of Hawaii found that the rice grown here did not come up to the quality of that to which they were accustomed, what more natural than that they should import rice from Japan to satisfy their wants? This they have done and are now doing to the extent of some 30,000,000 lbs. per year, and for which they pay a premium of one to two cents over the price for which they could obtain Hawaiian rice.

The Experiment Station has introduced various varieties of Japan rice in an attempt to obtain one that would be of the quality demanded by the Japanese population of Hawaii. Three have been tested and have been found to be to a certain degree of these varieties as well as one other of a previous introduction

inferior to the imported Japanese rice. Some of the local well-known Japanese, and also teachers and missionaries, have aided in these examinations. The latter through long residence in Japan have become quite expert in judging cooked rice, and they have agreed with the Japanese in saying that the newly introduced rices are greatly superior to any Hawaiian rices which they have tasted heretofore, but that there is yet a slight inferiority. Whether or not this deterioration results in one year or whether it is gradual through several years has not yet been fully determined, but that there is a difference was almost unanimously decided.

In just what respects the Hawaiian rices are inferior was a thing that was rather difficult to determine. Some said they lacked in oiliness, or in richness, and all were agreed that the drying out of Hawaiian rices when cold was the chief objection which could be made to them. Recently more detailed statements of the differences have been given to the writer, and from these it will be noticed that the difference is in culinary and physical properties, and in flavor, all of which properties depend upon the taste of the judge and can not be determined as accurately as can the differences in wheat by a chemist. The points given were as follows: Hawaiian rice requires more water in cooking; it swells less; it is harder than Japan rice; it is not so easily softened; to the tongue it has a coarse, rough feeling like cotton cloth to the skin, while Japan rice feels as silk; it has a peculiar smell when cooked—not so agreeable as has the Japan rice; the grains do not stand out vertically nor have they the luster which the grains of Japan rice have when cooked; it does not hold moisture when cold, but becomes dry and rubbery; it has inferior flavor; it has not the oily strength of the Japan rice.

If the points could be reduced to the score card form and the student could study rice by the card while tasting different samples, perhaps any one could be taught to be a good judge of rice as well as they are now taught to be of butter and of other products; but as this has not been done these points can be used by any one who desires to try and discover what is meant by "quality" in rice.

These differences apply particularly to the Hawaiian Gold Seed and to Chinese varieties of rice and to a lesser degree to the Japan rice when grown in Hawaii; and as stated above the latter has in some cases been pronounced equal to the imported article, but the consensus of opinion was that it was not equal. The judges call attention to the fact that the manner of cooking has much to do with the bringing out of the best qualities or properties of a rice and that a poor rice well cooked is better than a good rice poorly cooked. Whereas many cooks use two or three parts of water to one part of rice, it is stated that with less water the rice will be "flakey" rather than "soggy." I am indebted to Mr. H. Tsurashima of the Hawaiian Japanese Chron-

icle for the following directions for cooking rice: After washing the desired amount of rice until the water comes clear, add 1.3 pints of water for each pint of rice (1.1 pints for Japan rice); use a heavy wooden cover to prevent the loss of steam and juice (for this reason also a proportionately large cooking utensil is advisable); put over a strong fire where boiling will begin in ten minutes; boil ten minutes; reduce the strength of the flame and boil another ten minutes; reduce the flame to a very weak point and boil for another ten minutes; extinguish the flame and let stand for five minutes; it thus requires 45 minutes to properly cook rice, and during this time the cover should never be removed. Over anything but a gas stove, the kettle, of course, would be pushed to the rear or to the side to reduce the strength of the flame. When cooked in this manner all of the peculiar points above mentioned will be very strongly brought out, and the flavor especially will be such that even those who profess a dislike for rice, will find that it is one of the best of dishes. Furthermore, to a poor man it will be quite a saving if by using the proper method of cooking he can substitute rice for some of the other expensive sources of starchy foods.

After all of this discussion we are still in the dark as to what is the real cause of the difference in the quality of rice and why the Hawaiian-grown rice should be inferior to the imported article. The inferiority being principally, as shown, a matter of flavor, all that we know is that either in the climate or soil of Japan is some factor which is the cause of the superiority of the Japan rice. We have grown the same varieties and have cultivated them in the same manner as they are cultivated there. It may be that the cooler climate, or a difference in the length of the growing season, may account for the changes. Or it may be that the use of organic manures in large quantities, which practice is more common in Japan, exerts an influence upon the quality, and this reason has been suggested by one interested in the study of this problem. In accord with this, too, we find in the Experiment Station Record, Vol. 23, page 467, that: "In India a difference in composition of rice is noted, the average protein content being lower (6.58%) with Cuttack rice and the highest being 7.69% with Bombay rice, while the individual variations were from 5.44% in Cuttack to 9.80% in a sample of Broach." "Local reputation and market value coincide in some cases with the high protein content * * * and in other cases there is no connection between them as in dadkhani rice of Bengal.* * * The richness of the grain appeared to be due to the method of cultivation rather than to the races (varieties) of plants, the grain having the better composition being grown upon rich virgin or highly manured land * * * manuring of land appears to be one of the principal means of improving the quality of the grain for commercial and edible purposes." It was found with wheat that manuring slightly increased the

quality of the grain, but that this cause could be entirely offset by the effect by climate; whether or not the same would hold true for rice has not been determined, and much experimental work along that line remains to be done before we can be at all certain of the exact causes of what we know to be definite variations in the quality of rice.

ECONOMIC ZOÖLOGY.

Our Motto: "Utilization, not Extermination."

Conducted by FRANK FINN, B. A., Hon. F. Z. S.

COCONUT ESTATES AND ARMY REMOUNTS.

(*Tropical Life* for April, 1913.)

Referring to the article in our July issue, "Remounts for the Army," in which we urge owners to seriously consider the possibility of breeding horses suitable for army remounts on large coconut estates, we see by the *Tropical Agriculturist* that the Ceylon Government is about to start a horse-breeding farm in the neighborhood of Ambepussa railway station. This establishment, adds our contemporary, should offer immense facilities for such work as has been indicated above. Mr. A. L. Hutchison, London correspondent to the *Times of Ceylon*, in commenting on, and supporting our suggestion, called attention to the success of the pony-breeding establishments on the Island of Delft, off Ceylon. "My pony, 'The Birdcatcher' (14.2)," he goes on to say, "which once had a great reputation in Haputale, was a Delft pony. He was hard to beat in the matter of stamina, and there was simply no tiring him. He was an Arab, and as the late 'Skip' Shelton used to say of him, he was 'a perfect miniature charger.' Something heavier and more of a weight-carrier could doubtless be bred."

This reminds us that the advice we give in our book on "Coconuts," as well as in the columns of this paper, urging estate owners and land proprietors to take up cattle-breeding, sheep-farming and hog-raising, so far as their means will allow, was given none too soon. On every side we are constantly hearing complaints of the shortage of food supplies, particularly of meat. Berlin had what almost amounted to a riot, owing to the high prices demanded, whilst even Switzerland, we believe, is importing Argentine cattle. In the United States, here in England, and elsewhere, the rise in the cost of meat and other foodstuffs is eating a big hole in the increased wages of the public; so much so that much as wagepayers are already complaining, it seems unlikely that the present level of wages has anything like touched its

highest. All this naturally affects the cost of machinery and manufactured goods sent by the meat-buying countries to the tropics. If, therefore, estate owners can see their way to increase the world's meat supply, they will not only benefit the public generally, but, by lowering the cost of living, or at least by helping to discourage its going still higher, they will benefit themselves in more ways than one.

The Ceylon papers, some time back, in speaking of the scarcity of meat, reported that at Matale prices showed a rise of 120 per cent. on November 12, for on that day there was only one ox available to supply eighty planters and their families on the estates, as well as the general public in the town. We feel that, in face of such news, one and all of our readers who can do so, will at once begin to seriously consider the rearing of cattle and other stock for supplying their meat to those requiring it, in the same enthusiastic and practical manner that they have done and are doing with the planting of rubber and coconut palms for their produce.

Meanwhile, with regard to the supply of remounts for the British army, matters do not mend. Mr. Walter Runciman, M. P., President of the Board of Agriculture, speaking at the conclusion of the Van Horse Parade held annually on Easter Monday in Regent's Park (London), told his hearers that a year ago a government publication put the deficiency of young horses at 200,000, and then he added: "It is vastly greater today."

Colonel Seely, M. P., Secretary for War, who also spoke, owned that it was a fact that the government was faced with a great difficulty. The number of horses available for peace times did not come up to the requirements of traction in war times.

Meanwhile, as the *Daily Mail* reminds us, the horse-breeding season starts about the end of March, and the present one promises to be much the most disastrous known. Small farmers have quite given up horse-breeding. The English government, unlike the German and French and Austrian governments, has done nothing to remedy the defect. Unless something is done the transition period, which Colonel Seely mentioned in his speech, will end in the extinction of the British war horse. The horses bred under the development grant scheme go for the most part abroad.

We feel justified, therefore, in again calling attention to our article, published in July, 1912, on "Remounts for the British Army: Can they be raised on Coconut Estates?" In face of the above statements, made by the highest authorities, the question of raising remounts in the Colonies should not be allowed to rest.

According to the *Journal of the Board of Agriculture* (England), it was clear that when coconut poonac was fed to cattle the butter made from their milk was much firmer; those, therefore, making butter in warm countries may find coconut cake of considerable advantage as a feed. These experiments were car-

ried out at Wye Agricultural College. We should be interested to know how similar experiments carried out with poonac fresh from the press, if fed to cattle on the coconut estate itself, would compare with above. Speaking of this reminds us that cream separators are now seen working in many big cities in India. They make a large quantity of separated milk available for use. Fuller particulars of the above will be found in the January *Journal of the Agricultural Institute*, Pusa, India.

According to the *Indian Trade Journal*, Mr. Ledgard, president of the Bengal Chamber of Commerce, in addressing the members at their annual meeting, referred to wool and sheep-breeding, pointing out that prices for wool had been advancing all over the world continuously since 1908, and India had kept pace with the advance, and the period of dear wool was not likely to be ended. The Indian government had under consideration the necessity of endeavoring to improve the breed of sheep on the plains of these provinces, and some rams were imported from a part of Australia the climatic conditions of which closely resembled those of this part of India. Breeding operations were going on, and an improvement in carcasses and wool was fully anticipated.

Experiments show that, so far as soya and cotton cake are concerned when feeding dairy cows in England, the one can be safely used as a substitute in a ration for the other. Although the results obtained were nearly equal for the two cakes, yet what slight advantage there was showed that soya cake was slightly better for milch cows than decorticated cotton cake, which is slightly richer in oil, while the soya cake is slightly richer in flesh producers.

ARE DRY-FARMING METHODS AN ADVANTAGE IN THE TROPICS?

(*Tropical Life* for April.)

The manual on "Dry Farming: a System of Agriculture for Countries under a Low Rainfall," published by Dr. John A. Widtsoe, A. M., Ph.D., president of the Agricultural College of Utah, came to hand at much about the same time as we received an issue of the *Times of Ceylon* (February 4), with two most interesting articles on the possibilities of "Dry Zone Cultivation in Ceylon," the first being the report of a paper read by Dr. H. M. Fernando before the Ceylon Agricultural Society on the subject, issue of the *Times of Ceylon* (February 4), with two most interesting articles on the possibilities of "Dry Zone Cultivation in Ceylon," the first being the report of a paper read by Dr. H. M. Fernando before the Ceylon Agricultural Society on the subject, and the second a series of paragraphs by the paper itself dealing with various products that might be cultivated by dry-farming methods. Both the book and these articles should be carefully

studied by all those owning or interested in lands in tropical centers, as by their doing so many areas at present neglected and further deteriorating would, we believe, not only be made revenue yielders, but would also tend to become more fertile. "Nearly six-tenths of the earth's land surface," Dr. Widtsoe tells us, "receive an annual rainfall of less than 20 in., and can be reclaimed for agricultural purposes only by irrigation and dry farming. A perfected world-system of irrigation will convert about one-tenth of this vast area into an incomparably fruitful garden, leaving about one-half of the earth's land surface to be reclaimed, if at all, by the methods of dry farming." Unfortunately we have no room to properly review the book, but a glance at the index is bound to send the most indifferent cultivator, if he is in any wise worthy of the name, foraging through the book to see what it has to say. Take the question of root systems, to which Chapter VI is devoted; here we find discussed such matters as functions, kinds, extent, and also depth of root penetration. The present status of dry farming is described in Chapter XVIII throughout the United States, and then in Mexico, Brazil, Australia, Africa, and the East. So much for places; now for products; and the *Times of Ceylon* again. This paper tells us that "The growing demand for land for the cultivation of the more important commercial products and the opening, in recent years, of extensive plantations has resulted in a very large area of what is considered suitable land being absorbed; the possibility of cultivation in the dry zone (i. e., of Ceylon) has therefore been attracting attention for some time; this being so, the point to be considered is what products can be profitably cultivated in this arid zone." The following crops are discussed and recommended: Ceara rubber, tobacco, cassava, chillies, ground-nuts, as well as the raising of stock and the fodder to feed them. Dr. Fernando's paper also discusses the same ideas. From all we can learn from these and other reports on the utilization of tropical areas with a low rainfall, we feel certain that a far larger number of land-owners should make careful studies of the advantages offered by the modern system of dry farming.

Dr. Widtsoe's remarks on pp. 92, 93 are worth noting by those who believe, as we do, in breaking up the top soil between cacao, rubber, and other trees in the tropics, to conserve the moisture during times of drought, by breaking the capillary attraction that draws the subsoil water to the surface when it evaporates and is lost, but fear to do so, lest by damaging the surface roots they do more harm than good. "A great deal," he tells us, "has been said and written about the danger of deep cultivation, because it tends to injure the roots that feed near the surface. True, deep cultivation, especially when performed near the plant or tree, destroys the surface-feeding roots, but this only tends to compel the deeper lying roots to make better use of the subsoil. When the subsoil is fertile, and furnishes a sufficient amount of water, destroying

the surface roots is no handicap whatever. On the contrary, in times of drought, the deep-lying roots feed and drink at their leisure, far from the hot sun or withering winds, and the plants survive and arrive at rich maturial, while the plants with shallow roots wither and die, or are so seriously injured as to produce an inferior crop * * * (for reasons stated); an excess of moisture in the upper soil when the young plants are rooting is really an injury to them." There are those who claim that no one can plow between cacao and rubber trees, but we know that they can and do cultivate if they are wise, and as a proof that what we say is correct, at any rate as regards rubber estates, we have borrowed a photograph from Messrs. Marshall, Sons & Co., Ltd., of Gainsborough (Eng), showing their oil tractor at work between the young trees on an Eastern rubber estate. The block included here shows that the tractor and cultivator can easily pass up and down between the trees, and by doing so the fertility and yielding-power of the soil is greatly increased.

Those who have stood in cacao and other estates in the full tropics, where damp and heat are rampant, if they are not prejudiced against inter-crop cultivation, must realize as they notice the damp, dark, often sourish soil, the moss growing over it and up the trunks, lichens and epiphytes also, what an advantage it would be to break up this top spit and let out, in this case, excess moisture, and allow air to get down below. This is in the wet or damper seasons. In the dry seasons, and those of prolonged drought, as Trinidad and the West Indies have been suffering from, this broken surface would turn into a dust mulch, and the roots driven downwards in consequence of your having persistently ruptured the surface weeders, would surely, as Dr. Widtsoe says in speaking of arid lands, find that coolness, air and moisture below that they cannot obtain nearer the surface, and which, on uncultivated areas, they would never have access to.

*THE INTERNATIONAL RUBBER EXHIBITION,
LONDON, 1914.*

(From *The Rubber World Supplement*, March 27, 1913.)

The matter we print this week relative to the fourth International Rubber Exhibition, to be held in London next year, may well make some people rub their eyes in astonishment. Another exhibition in active preparation! Fifteen months seems a long time to look ahead; yet when the interests affected are world-wide fifteen months disappear almost in a flash, and the next great International Rubber Show to be held in London combined with the first Cotton, Fibres, and Tropical Products Exhibition, already to a very large extent shapes itself in the brain of the organizer. Successful exhibitions are the result of long-continued and wholly strenuous preparation. There are big things to be compassed,

a thousand ideas to be elaborated, proposals affecting whole countries and a vast and many-sided industry to be discussed and decided upon. The correspondence and the interviews, which are the essential preliminaries, in themselves call for stupendous effort; the allotment of space demands mathematical precision, and that in its turn must be supplemented by the spirit of the artist if the result is to be anything more than a heterogeneous collection of items large or small. Run one's eye over the Advisory Committee, and when one realizes that there is not a name in the list which is not there by written authority, one may well understand that even this trial-canter is no mean accomplishment. Beside the preparatory work the final metamorphosis of the venue of the Exhibition, whether it be in the Agricultural Hall in Islington or the New Grand Central Palace in New York, is a detail. Yet what a detail! A week before the Rubber Exhibition was opened in New York, floors were bare, spaces were unoccupied; on the opening day floors and spaces had been filled with heavy machinery, or tons of rubber, or stands which represented big concerns; it all seemed to spring into existence by magic, and when the closing hour struck, by magic again it disappeared. The magic was just that of the organizing brain, which mapped out everything months in advance.

So here we are again with another International Rubber Exhibition in full preparation. The 1914 Exhibition bids fair to eclipse its predecessors in every respect, and its interest and importance will be augmented by its joint character—the tropical products other than rubber making the appeal doubly strong. The day has long since gone by when there can be any question as to the effect exhibitions have on business. They are an education in that they bring people interested into direct touch with the latest developments of the industry. They give people who would never otherwise come together opportunities of exchanging ideas, and for years after the exhibition its influence is felt in ways which it is not always easy to trace to the proper source. In New York, among the things that impressed one most was the surprise of certain American firms who had not exhibited before at the amount of direct business which had resulted. What the indirect effects would be no one could predict, but they certainly would be considerable. The 1912 Exhibition did in America what the 1908 Exhibition did in London; it brought planter and manufacturer and machinery maker for the first time into personal relationship, and that must affect the whole future of the industry. The 1914 Exhibition should be the greatest of the series because exhibitors as well as organizers know better each time how to make the most of opportunities. So far as one country at least is concerned the event will be peculiarly opportune. The Planters' Association of Ceylon will celebrate its Diamond Jubilee next

year, and the Ceylon section should make a Diamond Jubilee exhibit of the product which crowns the prosperity of the plantation industry sixty years after the Association was founded.

E. G. S.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, April 30, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—Reporting on the work of this division for the period of April and part of May, exclusive of the matters dealt with in an intermediate report of April 22, I would say that the work of reconstructing the animal quarantine station has been pushed so far as the weather has allowed, the frequent heavy rains having made it impossible to undertake any concrete work up to this date.

It may, however, be stated that the vexing question of keeping the animals from destroying fence posts and gates seems to have been solved, cheaply but effectively, by increasing the number of posts so that no distance between them exceeds eight feet, tying the tops with a 2'x4' running plate or stringer and applying a heavy coat of paint and sand to all exposed woodwork. When dry the paint and sand form an apparently effective protection against the teeth of horses and mules, no attempt to bite the woodwork having occurred for a period of nearly three weeks, during which time the pen first finished as described has been constantly filled with mules to its capacity; that is, from 25 to 30 head. There is, of course, the possibility of the sand being worn away by rubbing, but if closely watched this contingency may be easily guarded against.

Owing to continuous heavy showers it became necessary to lay off the carpenters for nearly the entire past week, and concrete work could not be thought of. This work will, however, be started in a few days, and, with the Board's permission, it will be done by day labor, not by contract, using the same men who have been employed there for the past month. The reasons for this suggested change are, in the first place, that I can save from \$50 to \$75 on the job; second, that it will be impossible to empty a sufficient number of cages long enough for the concrete to harden—if the work is done by contract; and, finally, that the carpenter now in charge is not a "concrete man" and consequently does not care to take a contract on the job. I have, however, familiarized myself with this work and feel confident that I can supervise both the mixing and the laying of the concrete and, as stated, reduce the cost considerably. The main point, however, is that only a limited number of kennels can be emptied

at one time—a condition that no contractor could put up with—while by day labor I can employ the men on other work while the concrete is hardening.

HILO QUARANTINE STATION.

While the final contract and bond has not been received from Dr. Elliot as yet, the president of the Board, who has just returned from Hilo, has informed me that arrangements have been made for the construction of the station and that work will be commenced without delay. When received these papers should be filed with the Auditor of the Territory without delay so as to enable him to make the requisite disbursements.

KAHULUI QUARANTINE STATION.

I regret to report that to this date I have not succeeded in reaching a satisfactory arrangement for the building of this station, the appended correspondence showing the present state of the negotiations. As will be seen, the delay is due to the threatened tariff revision, but in case the managers of plantations and ranches most interested in the building of the station should refuse to undertake its construction, it will become necessary to have the work done by some contractor, and to reduce the size of the station sufficiently to allow for his profit and at the same time keep within the limits of the appropriation. I have today written Dr. Fitzgerald to take this matter up without delay, stating that the Board expects him to give his time and services to the same without stint.

TUBERCULOSIS CONTROL WORK.

During the past few weeks this office has received from the Board of Supervisors a number of applications for the testing of dairy cows for tuberculosis, as required by the regulations of that Board. The animal test of all dairy cattle in this county should not be postponed any longer than is absolutely necessary, owing to the constant danger of the disease spreading where any cases may have been left or have developed since the last test. It is therefore respectfully recommended that this division be allowed \$100 for the month of June, for the employment of a lay inspector to assist in this work, so that the annual test may be started on June 1 instead of July 1. This work will also require the complete overhauling of the automobile, which needs a new set of fenders as well as to be painted and varnished.

GLANDERS.

I regret to report that Dr. Eliot has found two cases of glanders in a plantation stable near Hilo. Every precaution was taken

to check the outbreak immediately and no new cases have been observed during the past week. It is possible that the cases may have been epizootic lymphangitis, the specific infection of which is able to survive outside of the animal organism for a long period, which theory is borne out by the fact that no cases of glanders have occurred in that neighborhood for more than two years, and there is consequently no cause for alarm.

IMPORTATION OF LIVE STOCK.

As will be seen from the appended report of the Assistant Territorial Veterinarian, an unusually large number of live stock has arrived here recently, the greater number by far being mules for plantation work. The quarantine station has consequently been taxed to its capacity, necessitating the employment of an extra laborer as authorized by the Board.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit the following report for April, 1913:

Tuberculosis Control.

During the month the following animals have been subjected to the test:

Waialae Dairy, April 11-14—15 cows, 1 bull; 15 passed, 1 condemned.

M. Riedell, April 14-17—1 cow; passed.

C. K. Quinn, April 18-21—5 cows; passed.

In the bull in the Waialae herd we had an opportunity to test again the accuracy of the intradermal method. This animal had three large swellings in the submaxillary region which very closely resembled tubercular abscesses. To the touch they were quite firm, leading one to suspect that they were entirely encapsulated. They were not adherent to the skin or to the jawbone. Upon being subjected to the test the bull showed not the slightest reaction, which was surprising considering the presence of these swellings. The owner was advised to have the glands removed and to send some of the material to the laboratory for examination. This was done, the glands being removed by a local veterinarian and a portion of the material sent to the laboratory for diagnosis. A microscopical examination proved the abscesses to have been formed by the *Actinomyces* fungus. The bull was given the potassium iodine treatment for Actinomycosis and is

showing a perfect recovery. In the failure of the intradermal tuberculin test to cause a reaction it has again demonstrated its reliability and accuracy.

*Importations of Live Stock Through the Port of Honolulu,
April, 1913.*

April 2—S. S. Hilonian, Seattle: 1 crate chickens.

April 2—S. S. Arizonan, Seattle: 24 horses, Chas. Bellina; 15 horses, S. Macpherson.

April 4—S. S. Siberia, San Francisco: 2 elk, H. Hackfeld & Company.

April 8—S. S. Lurline, San Francisco: 24 mules, Schumann Carriage Company; 1 bull, F. M. Swanzy; 2 pigs, Club Stables; 24 crates chickens, N. B. Lansing; 1 crate chickens, Club Stables.

April 11—S. S. China, San Francisco: 1 dog (English setter), Mrs. F. A. Bell.

April 12—S. S. Virginian, Seattle: 20 mules, 1 cow, S. S. Paxson; 1 deer, Geo. Rodiek.

April 14—S. S. Sonoma, San Francisco: 8 crates chickens.

April 15—S. S. Mongolia, Orient: 2 crates Japanese games.

April 15—S. S. Wilhelmina, San Francisco: 37 crates poultry.

April 18—S. S. Manchuria, San Francisco: 1 dog, H. McNutt; 1 dog, Mr. Beswick.

April 18—S. S. Ventura, Sydney: 1 dog (fox terrier), Mr. Bonamy. This dog was allowed to enter the Territory free from quarantine, as rabies is not known to exist in New South Wales, and was accompanied by the required certificate of health.

April 22—S. S. Honolulan, San Francisco: 26 mules, C. E. Wright; 25 mules, Schumann; 2 mules, 9 horses, Domingo Ferreira; 29 horses, Oahu Polo Club; 38 crates poultry.

April 22—S. S. Hyades, Seattle: 1 German coach stallion, 8 Berkshire hogs, Alexander & Baldwin.

April 23—S. S. Marama, Vancouver: 1 dog (fox terrier), Miss Braisted.

April 28—S. S. Sierra, San Francisco: 56 crates poultry; 1 dog, Rubert Jeffkins; 1 dog, Mrs. H. O. Clark.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, April 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of April as follows:

During the month 38 vessels arrived, of which 26 carried vegetable matter and two vessels moulding and building sand.

| Disposal. | Lots. | Parcels. |
|--------------------------------|-------|----------|
| Passed as free from pests..... | 693 | 15,492 |
| Fumigated | 6 | 43 |
| Burned | 33 | 52 |
| Returned | 2 | 11 |
| Total inspected | 734 | 15,598 |

Of these shipments, 15,351 packages came as freight, 129 packages in the U. S. mail and 118 packages as baggage.

Rice.

During the month 17,160 bags of rice arrived from Japan and 1000 from China. All the different lots were examined and found free from pests and were passed.

Pests Intercepted.

Forty-two packages of fruit and 9 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, which were seized and destroyed.

For the second time we found the nymphs of a locust or Cicada in the soil around plants; this shipment, however, from Manila instead of Japan.

Eleven boxes of Mexican limes arrived from San Francisco, and as such fruit is prohibited from entry here, it was returned by the same steamer.

Hilo Inspection.

Brother M. Newell reports the arrival of six vessels, five of which brought vegetable matter, consisting of 67 lots and 1168 parcels. All lots were passed and but two cases of celery had to be cleaned.

Beneficial Insects.

Four lots of inoculated Japanese beetles were distributed to parties furnishing the beetles.

I received a letter from Mr. D. Morrison, agent for the Commercial Pacific Cable Company on Midway, in which he reports that no reappearance of the cottony cushion scale has occurred up to March 31. Over a year ago we sent a large colony of vedalia, with plenty of food to carry over on the trip, and at that time had the gratifying news that the ladybirds arrived in good condition. Mr. Morrison feels very grateful for the assistance my department has given him.

Queenbees.

A shipment of four queenbees arrived by mail, and after examination and being satisfied with the accompanying certificate, they were allowed to be delivered.

Inter-Island Inspection.

During the month of April 62 steamers were attended to and the following shipments were passed:

| | |
|------------------------|--------------|
| Plants | 80 packages |
| Taro | 726 bags |
| Fruit | 8 packages |
| Lily root | 35 " |
| Vegetables | 5 " |
| <hr/> | |
| Total passed | 854 packages |

The following packages were refused shipment:

| | |
|---|-------------|
| Fruit | 21 packages |
| Plants (rejected on account of soil) | 14 " |
| Lily root (rejected on account of soil) | 1 package |
| <hr/> | |
| Total refused shipment | 36 packages |

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the monthly report of the Division of Forestry for April, 1913:

During the first part of the month my own time was spent in Honolulu attending to various routine matters in connection with forest work.

From April 16 to 25 I was on the Island of Hawaii making an

inspection of forest planting on Kohala Mountain, above Waimea village, of fences on forest reserve boundaries on the land of Humuula, and of forest planting in progress under the requirements of government leases on both the Kukaiau and the Parker ranches. I also visited two of the experimental tree-planting plats on the slopes of Mauna Kea and the forest nurseries of the Parker Ranch at Waimea and Waikii.

Owing to the long continued dry weather, all forest planting, both on the Parker Ranch and at Kukaiau, has been delayed. Especially at Waimea a large number of seedling trees have had to be held in the nursery awaiting suitable conditions until they could be planted out. The trees planted in 1911 and 1912 on the government land of Puukapu, above the old Puukapu Homesteads and on the adjoining fee simple land of Waikoloa, have made an encouraging start, with very few losses, but the trees are not as far advanced in growth as they would have been had the weather conditions been more favorable.

While at Waimea I also looked carefully into the question of doing further planting on the government land on the mountain and of fencing the Kohala Mountain Forest Reserve boundary.

Forest Fire Record.

A forest fire in the upper portion of the Ninole Homesteads, Kau, Hawaii, is reported by the local district fire warden, Mr. Geo. Gibb of Naalehu, as having occurred on April 20. "About 300 acres of farm and scrub guava lands" were burned over. The burnt area "did not extend to the forest proper, confining itself to the valley between Pakua and the land of Punaluu." It was fought by laborers from the Makanau and Ninole camps of the Hutchinson Sugar Plantation Company under the direction of Mr. de la Nux, head luna for that section.

At the meeting of the Board of Commissioners, held on April 23, 1913, the following additional appointments were made in the staff of district fire wardens:

Kauai.

Mr. Frank A. Alexander, in and for that portion of the District of Kona extending from the Hanapepe Valley to the Puna District line.

Mr. Gaylord P. Wilcox, in and for that portion of the Districts of Koolau and Puna extending from the land of Anahola to the land of Olohena inclusive.

Oahu.

Mr. Andrew Adams, in and for that portion of the District of Koolauloa lying to the north and east of the lands of Kaunala.

Mr. C. J. Wheeler, in and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

Hawaii.

Mr. Alexander Morrison, in and for that portion of the District of Hamakua extending to the west from the boundary of the land of Paauhau, Island of Hawaii.

Nurseryman's Report.

As usual, the report of the Forest Nurseryman is transmitted herewith.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, April 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of April:

Nursery.

Distribution of Plants.

| | In seed boxes. | In boxes Transplanted. | Pot Grown. | Total. |
|--------------|-------------------|---------------------------|---------------|------------|
| Sold | 5500 | 200 | 480 | 6180 |
| Gratis | 200 | 480 | 564 | 1244 |
| | <hr/> 5700 | <hr/> 680 | <hr/> 1044 | <hr/> 7424 |

Collections.

| | |
|---|---------------|
| Collections on account of plants sold amounted to..... | \$ 7.95 |
| Collection on account of seed sold amounted to..... | 6.55 |
| Rent of building, Nursery grounds, for month of March.. | 35.00 |
| Total | <hr/> \$49.50 |

Plantation Companies and Other Corporations.

The distribution of trees to plantation companies amounted to

9000 in seed boxes, 200 in transplant boxes and 1324 pot grown; total, 10,524.

Experimental Gardens, Makiki.

The transplanting of seedlings, sterilizing and mixing soil, etc., have constituted the principal work.

U. S. Experimental Planting, Nuuanu Valley.

Over 2000 assorted trees have been planted in tin cans at the small nursery beside the quarters. These will be in good shape when required for further planting.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

BY AUTHORITY.

NEW FIRE WARDENS.

Several changes in the staff of District Fire Wardens were made at the meetings of the Board of Agriculture and Forestry held on March 21 and April 23, 1913, by the appointment of the following gentlemen for the districts named:

KAUAI.

Gaylord P. Wilcox—In and for that portion of the Districts of Koolau and Puna extending from the land of Anahola to the land of Olohena, inclusive.

Frank A. Alexander—In and for that portion of the District of Kona extending from the Hanapepe Valley to the Puna District line.

OAHU.

H. Blomfield Brown—In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua gulch.

George M. Robertson—In and for that portion of the District of Waialua lying between the Halemano and Opaepala gulches.

George Wilson—In and for that portion of the District of Waialua lying between the Opaepala gulch and the Koolauloa District line.

Otto Ludloff—In and for that portion of the District of Koolaupoko extending from and including the land of Heeia to the land of Kailua.

C. J. Wheeler—In and for that portion of the District of Koolauloa extending from the Waialua District line to and including the land of Kaunala.

Andrew Adams—In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

MAUI.

Arthur K. Jones—In and for the Districts of Honuaula and Kahikinui.

HAWAII.

George Gibb—In and for that portion of the District of Kau extending from the land of Punaluu to the Kona District line.

Donald S. MacAlister—In and for that portion of the District of Hilo extending from and including the land of Kukaianu to the Hilo District line.

Alexander Morrison—In and for that portion of the District of Hamakua extending to the west from the boundary of the land of Paauhau, and April 23, 1913, by the appointment of the following gentlemen for the districts named:

W. M. GIFFARD,
President and Executive Officer,
Board of Agriculture and Forestry.

AGRICULTURAL EDUCATION IN THE UNITED
STATES OF AMERICA.

We extract the following from an article written by G. J. Bosman, B. S. A., to the *South African Agricultural Journal* of January, 1913:

Perhaps no other country in the world is doing more for agricultural education today than the United States of America. In each of the forty-eight States and Territories constituting the Union is an agricultural college with an average attendance of about 400 students. In connection with each of these State colleges is established at least one experimental station equipped with an efficient staff of agricultural experts. Furthermore, in a great many States they have gone so far as to have a special agricultural teacher in each high school and normal college. Teachers in the rural public schools are required to have a knowledge of the elements of agriculture so that they can devote a few hours each week to the teaching of that. The American people realize the necessity of teaching the farmer his profession. Through the colleges, high schools, and experiment stations only a small percentage of the people is reached, so another institution or force was created with special purpose of taking scientific knowledge of agriculture to the homes of the farmers. This force was called the Extension Department. The Extension Department teaches the farmer agriculture; his wife, household science; and the boys and girls are being interested in the junior work of these two branches.

The following are a few methods used in imparting this knowledge to the people:

(a) Short winter courses held in local communities lasting from one to two weeks, and covering the studies of field crops, soils, live stock, and home economics.

(b) Special educational trains traversing the State, on which are discussed such subjects as mealie culture, hog raising, dairying, and domestic science.

(c) Farmers' institutes, boys' judging contests, boys' camps,

farmers' picnics, etc., are supervised by the Extension Department.

(d) Experimental and demonstration work on county farms is conducted by the department.

(e) Dairy test associations are formed by the department.

(f) Organizations, such as agricultural clubs, farmers' co-operative organizations, etc., are established.

(g) Schools, both secondary and common, county superintendents and teachers' institutes are held.

(h) Junior work with boys and girls is carried on.

(i) Publications, such as bulletins, circulars, leaflets, and score cards, are issued and distributed by the department.

(j) Correspondence covering all sorts of questions pertaining to the farm and home is answered.

SCHOOLS.

The best way of reaching the largest percentage of boys and girls upon farms with information on agriculture and domestic science is through the medium of the country school. The Extension Department is doing a great deal in promoting the idea of having agriculture taught in the country school. The need of teaching agriculture and domestic science in public schools is obvious if we take into consideration that only a fraction of one per cent. of the pupils of schools ever attend college. Already much is done in the United States of America to get agriculture taught in the public rural schools. The development of this line of work is of the greatest importance as it affects the rising generations of the nation.

JUNIOR WORK.

In the State of Iowa, United States of America, seven thousand boys and girls are taking special work in mealie-growing, gardening and domestic science. This work is done according to directions sent out by the Extension Department. The competition among these youngsters is strong in the annual contest and exhibits held at short courses. A couple of years ago the highest yield of mealies produced per acre by one of these boys engaged in this kind of work was 118 bushels, or in South African measure 38 bags. This boy has consequently done a noble work by getting four times as much as the average yield of the mealie belt of the States. He has demonstrated to the farmers the possibilities of mealie culture in the states. The boys in the different counties carrying on this work, obtaining the highest yield, were given a free trip to Washington, and had the honor of being the guests of the President for a few days. The girls who had won in the cooking and sewing contests were given the same privilege. In America the question is not how to arouse interest for this

work among the youth, but to get help enough to keep up with the demands for this kind of work among the people.

ORGANIZATION AND COÖPERATION.

Probably the greatest need among our farmers today is organization. The rural people need debating societies, clubs of various kinds, and organizations that will "boost" for better agriculture and the welfare of the farmer.

Hand in hand with organization goes coöperation, without which not much can be done to promote agricultural interests. The "working together" of the farmer and the business men in towns in the States is noteworthy. The business men are ever ready to assist financially and personally in all kinds of work like the organizing of a short course, giving premiums for contests and exhibits, etc.

The press also lends valuable assistance by using their papers to advertise and consequently make more successful short courses, institute work, and special agricultural trains. They also open their columns generously for disseminating information that help towards the upbuilding and bettering of agriculture throughout the country.

The above brief sketch of the different branches of work carried on by the department gives a general idea of the scope of the work. The prejudice some of the farmers had at first against agricultural experts has died away long ago. The American people have wakened up and are demanding agricultural education. The Extension Department with its staff of energetic bright men is the powerful machine that is revolutionizing the agriculture of today. Through the efforts of this organization more agricultural products are produced, better men and women are made, and happier homes are being established.

May the day soon dawn when in the Union of South Africa we will have such a powerful force at work which will revolutionize agriculture in our country, the same as was done in the United States of America!—*The Tropical Agriculturist*.

Hawaiian Gazette Co.

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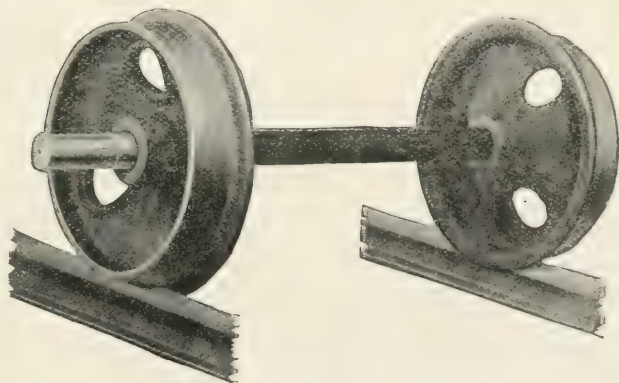
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 * First Report of the Board of Commissioners of Agriculture and Forestry, from
 July 1, 1903, to December 31, 1904; 170 pp.
 Second Report of the Board of Commissioners of Agriculture and Forestry, for the
 year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
 Third Report of the Board of Commissioners of Agriculture and Forestry, for the
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 Fourth Report of the Board of Commissioners of Agriculture and Forestry, for
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 Fifth Report of the Board of Commissioners of Agriculture and Forestry, for
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 Report of the Board of Commissioners of Agriculture and Forestry, for the biennial
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 "Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
 "Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables
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- * "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

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- * "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
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- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- * "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
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- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
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- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
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- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
- Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughe, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications
SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207
HONOLULU, HAWAII.

EDW. M. EHRHOEN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

JUNE, 1913.

No. 6.

EXCHANGE CHANGES OWNERS.

Among the most valued of our exchanges has always been the Tropical Agriculturist, published at Colombo, Ceylon. Its issue for March last contains an interesting announcement beginning thus: "The Tropical Agriculturist, hitherto the property of Messrs. A. M. & J. Ferguson, has been acquired by the Ceylon Agricultural Society who are now the sole owners of the journal. This is an event on which we think we may congratulate both the society and Messrs. Ferguson; the former on having become the owner of the foremost unofficial journal of tropical agriculture in the world, the latter on having successfully relaunched a great journal upon a career which we hope will be a fitting sequel to its past by achieving yet greater popularity." In further remarks the journal says that, while the affairs of the society owning it must come first, "yet its responsibilities extend far beyond the limits of this island, embracing indeed the whole tropic world and much of the sub-tropic." This view of itself by the Tropical Agriculturist may be conscientiously endorsed by the Hawaiian Forester and Agriculturist, which finds valuable resources of selected matter for its pages in its Ceylon contemporary, as well as noting with pleasure that the latter frequently utilizes the information put forth by experts connected with the territorial and federal agricultural investigations constantly being made in the Hawaiian Islands.

THREE FOREST RESERVES ON OAHU.

On May 31, 1913, the Governor of Hawaii and members of the Board of Commissioners of Agriculture and Forestry held a public hearing to consider the setting apart of three forest reserves in the Waianae District, Island of Oahu. The areas proposed to be reserved consist of the slopes at the heads of the valleys of Nanakuli, Keaau and Makua and of the upper part of the land of Kuaokala. Altogether the area amounts to 6160 acres, of which all but 340 acres is government land.

The object in setting apart these reserves is to bring about the reforestation of the upper portions of the valleys named with native Hawaiian vegetation—trees, shrubs and other under-

growth. When the old time cover is restored it is believed that the springs and small streams rising on the slopes can be much more depended on than at present. In a district naturally as dry as is Waianae, every possible source of water counts, and is therefore worthy of being carefully protected. The creation of these reserves is a step in this direction.

Following are the reports of the Superintendent of Forestry setting forth the reasons why these areas should be made forest reserves. All three projects have been approved by Committee on Forestry, and its recommendations were adopted by the full Board at the meeting held on March 21, 1913:

REPORTS OF THE SUPERINTENDENT OF FORESTRY.

NANAKULI FOREST RESERVE.

Honolulu, Hawaii, August 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—Following is a report, with recommendations, upon the setting apart as a forest reserve of the mauka portion of the unleased government land of Nanakuli, District of Waianae, Island of Oahu: 1010 acres.

The proposed Nanakuli Forest Reserve joins on the north the Lualualei Forest Reserve, proclaimed November 30, 1906, and on the east a proposed reserve embracing the upper portions of the fee simple land of Honouliuli, which latter project will shortly be brought before the Board for consideration.

Nanakuli is the first from the south end, of the valleys on the western side of the Waianae Hills. In topography it is similar to the other valleys on that side of the range, as far as and including Makua. All present essentially the same problems and in general should be treated more or less alike, although each valley has an individuality that makes separate consideration desirable.

One essential point in common is that all these valleys are on the lee side of Oahu and hence are in a dry district where every source of water, present or prospective, has high value. The forest problems here are to restore, as far as may be practicable, the original conditions of forest cover on the upper slopes, where appear the scanty but highly valuable springs, and to arrange for the extension of the forest, naturally or by artificial planting, on such sections of the lower slopes as cannot to good advantage be devoted to more intensive forms of agriculture.

In Nanakuli the forest line has been drawn around the upper portion of the valley, at the base of the steep slopes. Above this line, in my judgment, the native forest should be assisted to come back and should thereafter be there maintained. If this is done I believe that springs that are now irregular and that flow only

for a short time after rains will be made more steady and dependable. It is not contended that even with a dense forest cover on the slopes—of trees, shrubs and undergrowth—would the flow of these springs be permanent, but it is my belief that were the native forest restored, the regularity and duration of their flow would be sufficiently improved to justify the gathering of water, at any rate for a part of the year, through a pipe system from different sources, into centrally located tanks or reservoirs where the water would be available for use in connection with the lower lands. The first move in such a program is to get the forest back; the initial step is to set the area apart as a forest reserve. The purpose of this report is to recommend such action. The area is 1010 acres.

Nanakuli is a government land on which a grazing lease, held by the Dowsett Company for a considerable term of years, expired last February. The lower lands of Nanakuli are now (August, 1911) being again offered for lease. One of the conditions of the new lease is that a fence shall be built and maintained on specified portions of the forest line, whereby the forest will be protected. The remainder of the forest line, along the lower boundaries, follows natural barriers where fencing is unnecessary. The upper boundary of the proposed reserve is the crest of the main Waianae ridge.

One point about the boundary on its lower side perhaps deserves special mention, the inclusion in the forest reserve of the small lateral valley on the right or east side of Nanakuli Valley. There is now no water in this valley, but while obviously it is of much less moment than the section nearer the head of the valley, it seems to me that it should be included in the reserve. I endeavored to have the fencing provision in the Nanakuli lease include this lateral valley as well as the area further mauka. This was not done. Consequently, while included in the reserve this side valley will not be fenced off. The upper slopes are, however, fairly steep so that to some extent they protect themselves.

At present the forest in Nanakuli, apart from Algaroba on the lower lands and scattering groups of Kukui along some of the stream beds, is limited to groups of native trees well up on the slopes where they have been more or less out of the reach of cattle. With the construction of the fence on the forest line depredations by grazing will be stopped and much young growth, both of trees and undergrowth, ought soon to be in evidence. The ultimate object is to get back on the slopes as dense a cover of native forest as possible—in other words, to restore the jungle.

As well as from grazing the forest in Nanakuli has been subjected to injury by goats. Systematic shooting by Mr. H. M. von Holt above his outing house, "Pa Lehua," has helped to keep the goats away from the ridges at the head of Nanakuli, but a considerable band is said still to infest the crag on the west side of the valley known as Haleakala. One difficulty in arranging

for hunting goats here as a condition of the lease of the lower Nanakuli lands is that the Haleakala ridge is partly in Lualualei. Under the new lease of Nanakuli provision is made, along with clauses covering the exclusion of cattle from the forest area, for some goat hunting, but to exterminate the goats regular hunters will probably have to be employed by the government. This is a matter which ought to receive attention, not only in Nanakuli, but as well in all the valleys along the leeward coast of Oahu.

For the reasons above set forth,—in brief, that by helping the native forest to come back at the head of Nanakuli Valley, the local water supply stands to be improved, I do now recommend that the Board of Agriculture and Forestry approve the setting apart of the area covered by the following technical description prepared by the Government Survey Office, as the Nanakuli Forest Reserve, and I further recommend that the Governor of the Territory of Hawaii be requested to proceed after the customary manner, officially to set this area apart.

[The technical description of boundary is here omitted as it will later be published in the Forester as a part of the proclamation of the Nanakuli Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

MAKUA-KEAAU FOREST RESERVE.

Honolulu, Hawaii, September 10, 1912..

Committee on Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN :—I have the honor to submit as follows a report recommending the creation of a forest reserve and the setting apart as portions thereof of parts of the government lands of Makua, Kahanahaiki and Keaau in the District of Waianae, Island of Oahu. Included in the proposed reserve is also a small portion of the privately owned land of Ohikilolo, belonging to Mr. L. L. McCandless; (340 acres). The lower portions of the two government lands first named are under lease to Mr. McCandless for a ten-year period, until February 21, 1920. The lease (No. 730) contains the provision that a fence shall be built on the forest reserve boundary within one year after the date of the creation of the forest reserve. The total area of the proposed reserve, which I suggest be called the Makua Forest Reserve, is 4716 acres.

The object of the proposed Makua Forest Reserve is to control the slopes at the heads of the several important valleys on the leeward side of the Waianae Range. The idea is, eventually, to replace on these slopes a dense cover of forest—Hawaiian trees, shrubs and undergrowth—in the expectation that thereby the

local sources of water may be protected and the flow from them made more dependable, if indeed in some cases it cannot be increased.

The problem presented in these valleys is one common to all the lands on the lee side of the Waianae Range. This is naturally a dry district, with only a few permanent sources of water. Most of what there are are at best intermittent. But in view of the great need for water hereabout it is highly important that all possible sources of supply should be conserved and developed. As I have recently argued this point in a report on Nanakuli (dated August 9, 1912) it is unnecessary further to enlarge upon it here.

Unfortunately the native forest on the slopes at the upper ends of Makua and Keaau Valleys has suffered severely in the past both from stock grazing from below and from the ravages of wild goats from above. Through these agencies the former native forest was opened up and the undergrowth destroyed. In many places the old forest has now wholly disappeared.

The natural consequence is that the springs have dried up or have become very irregular in flow. With the restoration, as far as is now possible, of the original forest conditions it seems to me reasonable to expect an improvement in the local water situation.

Naturally the first step in such a program is to clear the slopes of cattle and to get rid of the goats. A start has been made in the latter particular by the hunting that has gone on at intervals at Makua. Systematically followed up it ought now to be possible at reasonable expense practically to exterminate the goats in this section.

With the construction of several comparatively short stretches of fence between natural barriers across several of the lateral valleys cattle can be excluded from the mauka section. It is not necessary that the whole forest line be fenced; certain portions only will be sufficient.

Where there are still groups of trees left to furnish seed, the native forest ought gradually to come back naturally. It goes without saying that could the process be assisted results could be hoped for much earlier than where nature is left to take her own course. On the lower slopes of all the valleys the Algaroba is spreading rapidly. It will soon form a cover, at any rate up to an elevation of from 800 to 1000 feet. The principal purpose of this Forest Reserve is to help in getting back the native Hawaiian forest at the heads of the valleys where are most of the water heads.

The forest line across these lands was first laid out some five years ago. This last spring the section across Makua was slightly modified to facilitate fencing. As has already been said the lease of Makua carries a fencing clause. The lower part of Keaau has been cut up and sold as homesteads. It is required that the mauka

line of the top lots be fenced. Up to a few months ago no fencing had been made, but the time is not up for another year.

The Makua Forest Reserve project has been pending for a considerable time, one reason for the delay in getting final action on it being that it was expected to include all the forest lands on the Waianae hills in one reserve, and Makua was held up awaiting action on other tracts. It has lately been decided to set apart several smaller forest reserves, separately.

Based on the reasons herein set forth, I do now recommend that the Board approve as the Makua-Keaau Forest Reserve the area covered by the technical description which accompanies this report, and that the Governor of the Territory be called upon to hold the required hearing and thereafter to create this reserve and set apart as portions of it the government lands within its bounds.

[The technical description of boundary, prepared as C. S. F. No. 2396 by the Territorial Survey Office, is here omitted, as it will be published later in the Forester as a part of the proclamation of the Makua-Keaau Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

KUAOKALA FOREST RESERVE.

September 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—The following report recommending the setting apart as a forest reserve of a portion of the government land of Kaena, Kuaokala Mountain, District of Waialua, Island of Oahu, is respectfully submitted for your consideration.

The area proposed to be set apart is situated on the upland plateau mauka of Kaena Point at the western extremity of the Waianae Range. It includes part of the government lands of Kuaokala, District of Waialua and Kaawaula (government), District of Waianae. Both lands are now under lease to Mr. L. L. McCandless, respectively Leases No. 739 (expiring Jan. 1, 1916) and 730 (expiring February 21, 1920). The total area of the proposed Kuaokala Forest Reserve is 434 acres.

Kuaokala consists of a gently sloping upland, much cut up by lateral valleys, most of which run toward the north. It is cut off from the low lands along the shore by a steep pali and is only accessible over rough trails. The approximate elevation of the mauka part of the upland is from 1400 to 1500 feet. The land has been used for a long time for grazing cattle. Of late years, at any rate, it has been but comparatively lightly stocked.

The purpose in proposing the reservation of a part of Kuaokala for forestry is to secure protection for a water head that locally

is of high importance, near the upper end of one of the main branches of Manini Gulch. Here, a little above a dairy house built by the late Sam Andrews, a tunnel has been dug from which a comparatively small but constant flow is secured. When I was there in February last it was estimated that the flow was about 2000 gallons.

In the valley above the tunnel is a fair stand of Kukui trees. Further mauka, on the ridge between the head of this valley and the small basin at the head of Keekee Gulch, "Malokea," there is Ohia Lehua, with other trees and native vegetation. In the adjoining Kaluakauila Gulch, that runs to the south, is a fairly heavy stand of forest.

The slopes of the small valleys on Kuaokala are not steep enough to serve as natural barriers; neither are they first class grazing land. While the area of the reserve is 434 acres, I should say that all but about 100 acres could be spared from the grazing area without material inconvenience.

A number of the ridges between the gulches named show the results of goat work, which has started erosion. Goats are said now to have been pretty well driven off Kuaokala through continued hunting.

The main trouble at Kuaokala is the cost of fencing, and to be effective this forest reserve must be fenced. It is a difficult place to which to bring material. There are no posts to be cut locally. The expense will necessarily be high. About 10,000 feet of fence would be required, from the corner of the boundary fence near Puu Hakakoa, along the north side of the proposed reserve and across the Manini Gulch at the tunnel above Andrews' old house. The boundary on the south side follows an old fence line on which the posts are for the most part still available for use and some of the wire. This old fence runs to a pali beyond which, to the east, except perhaps for one short stretch, the boundary follows a ridge where fencing is unnecessary. I understand that there are a good many more posts along the line of this old fence for a way toward Kaena point, that might be utilized in building the fence line along the proposed forest reserve. Under the provisions of Lease 739 a fence must be built on the forest reserve line within one year from the date of the proclamation of the reserve.

Based on the contention that the water on Kuaokala is of sufficient importance to warrant that somewhat expensive measures be taken to safeguard its apparent source, I do now recommend that the Board approve as the Kuaokala Forest Reserve the area described in the following paragraphs, and that the Governor be requested, after the required hearing has been held, so as to set apart the land, in accordance with law.

[The Survey Department's description (C. B. F. Number 2364)

is here omitted as it will later be published in the Forester as a part of the proclamation of this Reserve.]

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, June 4, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to report on the work of this Division for the month of May, 1913, as follows:

Honolulu Quarantine Station.

All of the pens and enclosures have now been finished so that they may be said to be in perfect order and it is believed much stronger than they ever were before.

The sanding of all parts of posts, gates and plates that are at all exposed from the teeth of horses and mules has proven absolutely effective in preventing the animals from biting them.

A gate has been cut in the solid board fence leading into the glanders division and an alleyway built from this gate to the testing chute so that animals arriving and leaving may be taken through this chute to have halters removed or replaced without, as hitherto, having taken them out on the road and risking their escape.

The concrete work in the dog division is well under way, though work has had to be temporarily suspended on account of the rainy weather.

Hilo Quarantine Station.

Dr. Elliot reports that work on this Station has been started, and he requests that the caretaker be appointed at the earliest possible date in order that he may put him to work on the macadamizing in the shelter sheds, which it became necessary to cut out of the specifications for lack of funds. He states that there is plenty of rock available which this man can gather and use as a foundation on which small crushed rock can later be placed.

Cerebro Spinal Meningitis.

As was expected this disease has made its appearance following the recent rains, and it is possible that severe losses will occur

in the sections where this disease is known to recur annually. It has already been reported from both Molokai and Maui, and a new outbreak among the Government mules at Fort Shafter indicates that the disease may even be looked for from places where it has never been known to occur before. Four fine mules were taken with the disease during the middle and latter part of last week, and in the course of four or five days every one was dead in spite of the efforts of the military veterinarians as well as myself to relieve their suffering.

The true nature of this disease is absolutely unknown even though no other epidemic has been given so much attention as this one during the past year when it is estimated that the loss in the United States amounted to between 50,000 to 60,000 head during the month of August and September alone. The disease is supposed by some investigators to be caused by a molded or musty feed, while others are inclined to consider it as an infectious disease.

Hog Cholera.

This disease, which has hitherto occurred in these Islands only in an extremely mild form, seems of late to have gained in virulence, and considerable losses have been reported, especially in this city and vicinity. It is estimated that more than 1,000 hogs have died and the disease seems to be spreading steadily. The latest form of treatment for this disease consists in the hypodermic injection of blood serum taken from animals which have recovered from the disease, but this treatment is both expensive and difficult to apply. The price of treatment for a full grown hog ranges from \$1.50 to \$2.00, while smaller animals may be treated for from 50 cents to \$1.00. A detailed statement of what has been done in this line will be found in the appended report of the Assistant Territorial Veterinarian.

Tuberculosis Control Work.

The regular annual test of all dairy cattle in the County has now been started. As authorized by the Board the services of Mr. Joe Richards, formerly City Milk Inspector, have been secured and the work is now being systematized in such a way that all herds may be tested with as little inconvenience to the owners as possible.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 4, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

SIR:—I hereby submit the following report for the month of May, 1913:

Tuberculosis Control.

No testing has been done this past month due to the lack of transportation and an assistant. The services of Mr. Joseph Richards, one time City and County Milk Inspector, have been obtained for this Division by the Board of Commissioners, and in a day or two the necessary repairs to the machine will be completed when we can again start on this important work. The test this year, which is the fourth general test of the dairies in the City and County, should total close to 6,000 head of cattle.

Hog Cholera.

Several outbreaks of Hog Cholera have occurred during the past month in which the disease has assumed a greater virulence than has been experienced before in this Territory, and the resultant loss has been very heavy in some districts. Until recently Hog Cholera has never taken a prominent place in the list of diseases affecting live stock in this Territory. Assuming a very mild type it has been easily controlled by strict sanitation and prophylactic measures in the diet and care of the animals. Now, however, such measures seem to be of little avail and in order to control and entirely eradicate this disease an entirely different line of treatment has been inaugurated.

The treatment now being followed consists of subcutaneous injections of anti-hog cholera serum. This produces a passive immunity lasting from five to six months and enables the animals to successfully pass through an outbreak of the disease. We feel confident that we can by this means materially reduce the losses from this disease and keep it under control.

On the 22nd of May a valuable herd of twenty-seven (27) hogs owned by the College of Hawaii were given subcutaneous injections of anti-hog cholera serum varying in amounts from 10 to 50 cc. according to the size of the animals. A short time before the treatment was applied it had been reported at this office that hog cholera had broken out in this herd with the loss of two animals. Serum was immediately cabled for and upon arrival the remaining animals were at once treated. Since then no deaths have occurred and temporary immunity to the disease has been established.

Great care is necessary to prevent abscess formation at the point of injection. Thorough disinfection and clean surface are absolute requirements; 5 per cent. carbolic acid or a strong solution

of creoline or chloronaphtholeum; scrubbing brush and sponge are all that is needed to prepare the site for the inoculation. The point of injection is usually the inner surface of the thigh, the one exception to this being sows heavy in pig and which have to be handled with great care to prevent abortion. In such animals the serum is injected behind the ear.

Importations of Live Stock.

The following steamers have been boarded and the following live stock inspected and admitted to the Territory during the past month. Nineteen steamers have been boarded, nine of which were found carrying live stock as follows:

May 6—S. S. Lurline, San Francisco 26 mules, Schuman Carriage Company.

May 9—S. S. Mongolia, San Francisco: 1 crate chickens, 1 crate (2) Angora cats, A. W. Pavo.

May 12—S. S. Ventura, San Francisco: 2 crates chickens.

May 13—S. S. Hilonian, Seattle: 6 Angus bulls, Maui Agricultural Company.

May 13—S. S. Wilhelmina, San Francisco: 11 crates poultry; 1 dog, Capt. Winne.

May 19—S. S. Honolulu, San Francisco: 21 mules, Schuman Carriage Co.; 13 horses, Hawaiian Dredging Company; 2 horses, Capt. Holbrook; 1 dog, T. A. Montgomery; 23 crates poultry.

May 26—S. S. Sierra, San Francisco: 30 crates poultry; 1 dog, A. B. Camp.

May 26—S. S. Mexican, Seattle: 24 horses, Chas. Bellina.

May 26—S. S. Siberia, Orient: 1 dog, J. B. Reutiers.

Respectfully submitted,

L. N. CASE,

Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, May 31, 1913.

Board of Commissioners of Agriculture and Forestry, Honolulu.

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of May, as follows:

During the month 40 vessels arrived at the Port of Honolulu of which 24 carried vegetable matter and 1 moulding sand.

| <i>Disposal</i> | <i>Lots</i> | <i>Parcels</i> |
|--------------------------------|-------------|----------------|
| Passed as free from pests..... | 677 | 13,222 |
| Fumigated | 9 | 424 |
| Burned | 48 | 65 |
| Returned | 1 | 1 |
| * Total inspected | 735 | 13,712 |

Of these shipments 13,274 packages came as freight, 117 packages in the U. S. mail and 321 packages in baggage of passengers.

Rice.

During the month the following shipments of rice arrived:

From Japan 19, 704 bags.

From China, 1,400 bags, 500 mats.

Of this lot 300 bags of rice were found infested with the rice moth (*Paralcpia modesta*). We compelled the consignee to fumigate the shipment under our supervision and at his own expense. All the other shipments were found free from pests and were allowed to be delivered.

Pests Intercepted.

Thirty-eight packages of fruit and 24 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. These were all seized and destroyed.

In a shipment of seeds from Manila we found two seed weevils (*Aracocerus species* and *Cryptorhynchus species*). The latter species would no doubt cause considerable damage to large seed pods in the Territory as it is closely allied to the Mango weevil (*Cryptorhynchus mangiferac*) which attacks the seeds of the mango and causes decay and premature dropping of the fruit.

On a shipment of Orchids we found Mealybugs (*Pseudococcus citri*) and the Purple scale (*Lepidosaphes beckii*); also the larvae of the Orchid borer (*Acytheopeus aterrimus*). After fumigation each orchid was gone over carefully and all those infested were rejected.

In soil from Japan we found the pupa and larva of a large fly (*Ptecticus species*). This insect is closely allied to one of our decay flies so commonly found in over ripe bananas and vegetables.

Hilo Inspection.

Brother M. Newell reports the arrival of eight steamers and two sailing vessels. Five of the steamers brought vegetable matter consisting of 115 lots and 2381 packages. After all celery, carrots and beets had been washed they were allowed to be delivered. One sailing vessel had soil as ballast which was dumped at sea.

Beneficial Insects.

Owing to the abundance of the Japanese beetle many parties have brought live beetles for inoculation and 26 lots of inoculated beetles have been sent out during the month.

Inter-Island Inspection.

During the month of May 68 steamers were attended to and the following shipments were passed:

| | | |
|---------------------------------|-----|----------|
| Plants | 65 | packages |
| Taro | 738 | bags |
| Fruit | 16 | packages |
| Sugar cane (plants) | 400 | cases |
| Lily root | 12 | packages |
| Cocoanuts (sprouting) | 10 | |

Total passed 1241 packages

The following packages were refused shipment:

| | | |
|---|----|----------|
| Fruit | 16 | packages |
| Plants, rejected on account of soil | 21 | " |
| Vegetables, rejected on account of soil | 4 | " |

Total refused shipment 41 packages

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, May 31, 1913.

The Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows the routine report of the Division of Forestry for May, 1913:

Forest Reserve Matters.

During the month I made an inspection trip of five days to the Island of Kauai to look into questions of fence building on forest reserve boundaries above Lihue, Kealia and Moloaa. Earlier in the month, in company with the Governor, the Land Commissioner and the Surveyor, I visited the land of Hauula in reference to the forest boundary across that land, and on another day made an inspection of certain water developments in the Pupukea Forest Reserve.

Not a little of my time during May was spent in attending to details in regard to two proposed forest reserves on the Island

of Hawaii and one on Oahu. As soon as the official descriptions are received these projects will be submitted to the Board.

On May 31, the Governor and members of the Board held a public hearing at the Government Nursery to consider setting apart three tracts, mainly of Government land, in the Waianae District, Oahu, as forest reserves. The lands are the upper portions of the valleys of Makua-Keaau 4716 acres, Nanakuli 1010 acres, and the Makua part of the land of Kuaokala 434 acres. In all 6160 acres, of which only 340 acres (a fee simple land in Keaau valley) is in private ownership. No one appeared at the hearing in opposition to the creation of these reserves.

Forest Fire.

While on Kauai I learned of a small grass and brush fire that had occurred on or about May 20, on land immediately above the mauka Kapaa homesteads. The fire got away from a homesteader who was clearing land, but fortunately did not spread far. Ten to fifteen acres were estimated to have been burned over.

Improvements at Government Nursery.

Within the past few weeks a number of changes have been made in the arrangement of the stable sheds at the Government Nursery and in the shifting of location of the insectaries and other smaller buildings. When completed these modifications will add much to the convenience and usefulness of the service buildings.

Federal Assistance in Experimental Tree Planting.

The Federal Forest Service has informed me that for the fiscal year beginning July 1, 1913, the sum of \$200 will be allotted to Hawaii for use in continuing experimental forest planting work now in progress. This money will be used in getting the plantation of Eucalyptus in Nuuanu Valley well established and in planting out on Haleakala and Mauna Kea seedling trees now being held in Ranch Nurseries on those mountains.

Nursery Report.

As usual the report of the Forest Nurseryman is transmitted herewith.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, May 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is a report of the work done during the month of May, 1913:

*Nursery.**Distribution of Plants.*

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold | 150 | 112 | 262 | |
| Gratis | 3000 | ... | 881 | 3881 |
| | <hr/> 3000 | <hr/> 150 | <hr/> 993 | <hr/> 4143 |

Collections.

| | |
|--|---------------|
| Collections on account of plants sold amounted to..... | \$ 3.75 |
| Rent of building, nursery grounds..... | 35.00 |
| Total | <hr/> \$38.75 |

The men at the Nursery have been assisting the carpenters and plumbers in the work of repairing and making additions to the buildings.

Coöperating by request of the Outdoor Circle of the Kilohana Art League, a commencement has been made to plant the center plat of Kalakaua Avenue with Mahogany trees. The seed from which the trees were raised was sent to us by Mr. Gerrit P. Wilder when on a tour about two years ago. The trees were propagated at our Makiki station.

Plantation Companies and Other Corporations.

The distribution of trees during the month amounted to 16,000 in seed boxes and 1000 in transplant boxes. Total, 17,000.

Orders have been received for 4000 transplants to be delivered when ready.

Experimental Garden, Makiki.

The new soil sterilizer has been delivered and we expect to have it running in a few days. Other work done has been the regular routine work, potting and transplanting trees.

U. S. Experiment Planting, Numanu Valley.

The man has been transplanting new varieties of Eucalyptus into tin cans and hoeing around the small trees that still require a little attention.

Very truly yours,

DAVID HAUGHS,
Forest Nurseryman.

THE COÖPERATIVE CREDIT MOVEMENT.

(The Tropical Agriculturist.)

PROGRESS IN NATAL.

The more we come to study the rural conditions of Natal the more we are struck with the enterprise, the energy and the intelligence of the farmers of this province. Take, for instance, the extraordinary progress of the Agricultural Coöperative Union. It stands a splendid example of self-help and sturdy self-reliance of a society which scorns State aid. The name of the secretary, James Erskine Duff, seems to remind us of a Scottish Covenanter resurrected in the twentieth century to stir the dry bones of those colonists who live in this dream-like, lotus land. The Co-operative Union was started three years ago. It was formed by the amalgamation of the Wattle Bark Union and the Mealie Union. The membership is now over 900, and the annual turnover a quarter of a million sterling. To become a member the farmer must take up £5 shares either in one amount or at the rate of 10s. per annum spread over ten years. The idea is a limited liability company. The president of the union is Sir Thomas Hyslop, and there are three committees—for wattles, for mealies, for live stock. Take the matter of commercial manures, such as superphosphate, bonedust, basic slag and mealie fertilizer, all of which are largely used in Natal. The secretary calls for tenders, say, 4000 tons per annum. Naturally, such a quantity can be bought at a much cheaper rate than a small amount by a single individual. At the commencement of the season superphosphate was sold at £4 per ton to the ordinary farmer, whereas the Union member only paid £3 7s. 6d. per ton. The ordinary man pays 13s. to 14s. per bag of seed oats (150 lb); the Union member can get it for 12s. Formerly the cost of arsenite of soda used for dipping was £3 5s. per cwt. Through the efforts of this society it can now be purchased from the merchant at £1 5s. per cwt. The terms of the Union are cash on delivery, but there is also a system called the credit association. This means

that three or four members can club together and guarantee their own accounts if approved by the committee, up to twelve months' credit at 8 per cent. interest. This is the buying side of the business. Now as to the selling. The Union has sold this year 60,000 bags of mealies for members at prices ranging from 10s. to 20s. per bag. The members are under no compulsion to buy or sell with the Union. But they realize that the Union saves them much time and trouble and obtains the highest prices. To the up-country farmer the Union is of special value. Take the case of wattle bark. The Union has agents in London and Hamburg, makes contracts and ships direct. The other day a member received £1 per ton above the local market price in Durban. A form is sent out to all the members. They guarantee to supply a stated quantity of bark per month. With this knowledge the Union committee can watch the market and so secure the best price. The individual dealer in Durban does not know what quantity of bark he may have on hand month by month, and, consequently, he cannot offer as favorable terms. The Union also imports pedigreed stock, purchases fencing material, publishes a weekly agricultural gazette which is issued free of charge to every member, and now proposes to insure live stock of every description. It is another illustration of the advantage of friendly coöperation in modern farming. The day of isolation, suspicion and farm secrets is dead. The success of a nation is not measured by the fortunes of a few, but by the prosperity of every citizen.—*The Agricultural Journal of the Union of South Africa.*

IN THE PUNJAB.

We recently directed attention to the inestimable benefits conferred upon the agriculturists of the Punjab by the extension of the coöperative credit system in that province. There has just been issued from the government press a statement which shows how rapid has been the growth of this beneficent movement throughout India. In the five years from 1906-07 to 1911-12 the number of societies, central, urban and rural, rose from 843 to 8177 and the total membership from 90,844 to 403,318. The increase in the financial resources of the societies was even more marked. In the first of the years named the capital available, including loans from private persons and from other societies, share capital deposits by members, and State aid aggregated Rs. 23¾ lakhs. By 1910-11 the total had gone up to Rs. 230½ lakhs, while at the end of the past financial year it had still further increased to Rs. 337¾ lakhs.—*Indian Agriculturist.*

CO-OPERATION IN DENMARK.

The November issue of "Denmark Abroad," a monthly review, contains a lengthy article on the Danish Credit Societies by M. P.

Blem, President of the Credit Society of Estate Owners in the Danish Island Diocese-Districts. The principle works, as will be known, on the coöperative system.

A society of land-owners formed by debtors with the object of borrowing money jointly. It mints its own money according to the daily requirements, in the shape of treasury bonds, on which interest and instalments are to be paid with mortgage security in fixed property—under unlimited responsibility and with a reserve fund as an auxiliary support.

Sixty to seventy years ago there was an upward tendency in the financial condition, but money was scarce. It was almost impossible to procure mortgages, especially on farming properties, and many private persons possessing money dared not lend it out, even against the finest mortgage security. It is gratifying to know that credit societies, which act as a link between borrower and lender, remedied this disagreement. Their treasury bonds became the means of transaction, the means of credit and the substitute for missing money.

PLANTING COCOA.

The following notes have been contributed by Mr. A. H. Hoare to the *Journal of the Jamaica Agricultural Society* of December, 1912:

The young cocoa plants will succeed best if planted out through bananas, as they must have a certain amount of shade from the hot sun when young and the banana will answer satisfactorily for that purpose and enable the cocoa to be grown economically. Moreover, if the bananas have been properly cultivated the land will be already in good condition and will need no further preparation before planting. See that the land is properly drained, especially if it is inclined to be wet or if it is of a stiff clayey texture, otherwise the soil becomes in wet weather sodden and sour, and cocoa trees will not thrive when the soil is water-logged and sour. Choose land that has a good soil, deep because the trees send down a tap-root which although not assisting to feed the tree to any great extent, will greatly affect its health if it comes into contact with an impenetrable bed of marl or rock.

Avoid bleak, windy situations, for cocoa trees love shelter and suffer greatly from the effects of strong winds which cause defoliation and also injury to the tender young shoots. Valleys sheltered by hills and rocks, and stretches of land protected by good belts of timber are ideal situations if in a good rainfall.

Do not follow the examples of others and plant too close, for cocoa trees need light and air in abundance, and will never pay for over-crowding. On good rich land I would advise planting 12 to 14 feet apart in the rows and on poorer soils or on hillsides

where the trees will not grow so big 11 to 12 feet apart will not be too close. At these distances the trees should almost touch when fully grown and there will be ample space for the free circulation of light and air so needful for healthy growth of the trees and full crops of pods. In addition, the trees will shade the ground nicely, keeping it cool and moist and also preventing an excessive growth of weeds. Of course, the distance between the rows will depend on what distance the bananas are planted, as the row of cocoa trees will run between each row of bananas.

First, line out the rows methodically, and place a peg where each hole is to be dug. Large holes should always be dug to receive the plants, and I strongly urge the digging of them about not less than a fortnight to three weeks before planting. Good holes are important. They should be made at least two feet square and eighteen inches deep and the soil must be well turned out so as to expose both soil and hole to the beneficial action of sun and air. Then, just a few days before planting, fill in the hole with good surface soil, making its surface a little higher than the surrounding land to allow for sinkage. Unless this precaution is taken, when the ground sinks there will be a depression round the plant in which water will settle and cause the stem to rot away.

TRANSPLANTING.

When putting out plants grown in bamboo pots, great care must be used so that the plant shall receive as slight a check as possible in transplanting. Take care to see that the soil in the pot is well soaked before removing the plants. I advise placing them for a few minutes in a pail of water to soak and standing them aside to drain. When actually planting, the pot should be taken into the hand and carefully split open by making a cut at each side with a cutlass. Next, neatly reverse the two halves of the pot, make a good hole in the loosened soil with the hand and insert both pot and plant carefully. Do not plant too deep or too shallow, but sink the pot until its top is level with the surface, pressing in the soil around it. Then gently withdraw the two reversed halves of the pot, making everything quite firm and tidy afterwards.

The great advantage of preparing a good deep hole and careful planting is very soon apparent, for the plant makes a good start in the sweet loosened soil and grows away at a vigorous rate. One cannot too heartily condemn the slip-shod method often adopted of simply chopping a hole with the hoe, pushing in the plant with perhaps all the soil shaken off its roots, and then leaving it to take its chance. It is hardly to be wondered at that most of the plants, instead of progressing, gradually die out until the cultivator who put out a hundred plants eventually finds that he has only a dozen or so growing plants left. By following this

simple but very safe method, every plant should grow and in a few years form a uniform and profitable plantation.

In conclusion, I might mention the time-saving plan of always keeping back a few plants in pots so that in the event of any dying out, they can be renewed at once.

MANURING TREES.

It may seem a simple thing to manure a tree, yet the great majority of people who take to the idea of helping their trees with some manure, dump a heap against the trees. The majority, of course, do not manure their trees except by accident, expecting the soil to give crops out of good nature without assistance. Bananas are commonly treated thus, but the effect on such, being herbaceous plants, is to bring out roots high up, which when the heap of manure decays down are left dry and so are wasted. But on many trees, like orange and cocoa, the effect of a heap of manure placed against them is injurious. The most vital parts of such trees is the neck, that part where the roots start from the stem. The manure softens and tends to rot the bark there, encourage insects and grubs to attack the bark, while manure there can do no possible good. Trees take up their food material from all those little fine roots that start off from the large roots, and which are especially plentiful at the very end of the roots. And it is where these fine roots are that the manure should be placed, preferably in light open soils by spreading it as a mulch, and in heavy clay soils by digging the manure in and mixing it with the soil.

In mulching also, which is only a form of manuring, the mulch should not be put close to the banana, cocoa, coffee or coconut tree root; a clear circle should be left close to the stem.—*The Tropical Agriculturist*.

DRY ROT OF THE IRISH POTATO.

The Nebraska Experiment Station has just issued Bulletin 134, on "A Dry Rot of the Irish Potato Tuber."

For several years the department of Agricultural Botany has been engaged in a study of Irish potato diseases in Nebraska. Among these the dry rot of the tuber is one of the most important. Buyers and commission men have reported losses, during storage, of from 20 to 60 per cent. due to this dry rot. In fact, the most important feature of this dry rot is the fact that it forces the immediate sale of the crop as soon as dug. This tends to demoralize the market and places the grower at the mercy of the buyers, since he is himself afraid to store his crop and wait for better prices.

SYMPTOMS.

The dry rot here described is a strict tuber rot affecting mature tubers only. Neither the stems nor the young tubers are ordinarily in the least affected. Natural infection is known to occur solely through wounds produced in the process of digging or subsequent handling. In many cases this rot secured a foothold through wounds produced by scab-producing animals of certain sorts and perhaps even through scab spots due to fungus parasitism, though the latter method is certainly very rare if we may judge from the laboratory experiments.

The rotting is rather slow, and in general within four to six weeks from one-third to three-fourths of the tuber is destroyed. The epidermis of the rotted portion becomes slightly wrinkled and usually has a characteristic bluish color. On account of the rapid destruction of the underlying tissues the surface over these areas soon becomes distinctly depressed.

The rot may make its appearance at any point on the surface of the tuber, though more commonly perhaps at the bud end of the tuber. There is no watery degeneration of the tuber unless other organisms gain entrance, so that this is in fact a dry rot.

CAUSE.

Numerous inoculation experiments have shown that this dry rot is caused by a parasitic fungus, not previously described, for which we have proposed the name *Fusarium tubericorum*. At the same time it has also been demonstrated that this dry rot fungus does not cause the injury to the leaves and stems often referred to as "blight" or "wilt." In other words, the present dry rot of the tuber is not connected in any manner with diseased conditions of other parts of the plant.

METHODS OF CONTROL.

Extensive experiments have been conducted to learn if any treatment might be applied before the potatoes were stored that would reduce the amount of this rotting.

These experiments have clearly demonstrated that dry rot may be held in check through treatment of the tubers before being placed in the storage cellars. For this purpose the best results were secured through the use of either formalin dip, formalin vapor, or the lime-sulphur wash. Not only did the tubers in these lots show a very small percentage of dry rot, but they were in excellent condition otherwise when removed in April. The storage time, it should be remembered, employed in this experiment is longer than would ordinarily be employed by the average farmer and this gave the treatments a severe test. Under ordinary farm conditions the development of the formalin vapors is

not easily secured, and therefore we would particularly recommend the use of the formalin dip as the easiest method to employ and one that should give excellent results in practice.

Anyone directly or indirectly interested in potato growing should make it a point to read this bulletin. It may be had free of cost by the residents of Nebraska on application to the Nebraska Experiment Station, Lincoln, Nebraska.

E. A. BURNETT,
Director.

THE DAIRY COW.

A cow requires food whether she is milking or not. The amount of food necessary to maintain a dry cow in fair condition, so that she will neither lose nor gain in weight, represents what is called her "maintenance requirement." The maintenance requirement of healthy cows of similar weight does not vary much. If a cow is milking, however, she must consume and digest food in excess of her maintenance requirement. Otherwise she will lose in weight. The food consumed by a cow yielding milk is thus utilized for two different purposes. One part is required for maintenance, and this may be set down as working expenses. The other part is utilized to fill the milk-pail—it is the raw material from which milk is produced. What is a good cow? It is one which can digest and assimilate for milk production an amount of food which largely exceeds her maintenance requirement. But cows vary widely in this respect. From the University of Missouri there comes an interesting discussion of this topic in *Experimental Station Bulletin No. 2*. During two years the herd-testing at the station showed No. 27 cow to be a good milker, and her half-sister, No. 62, a bad one. They were registered Jerseys. In the third year it was decided to compare the food requirements of these cows, and for this purpose both were calved, as it happened, the same week. During the lactation period the food to each was regulated so that the live-weights remained constant, and the amounts of milk and butter fat were then compared with the amounts of food consumed by each cow. In the results it was found that the good milker was consuming about $2\frac{1}{2}$ times as much food, after deducting her maintenance requirements, as did the bad cow, and she also produced about $2\frac{1}{2}$ times as much milk. Altogether, with the good cow, 35 per cent. of the ration went for maintenance and 65 for milk; with the bad one the figures were 56 and 44. Ten bad cows may yield as much milk as five good ones, but they will require twice as much food for maintenance purposes. As it is only the food utilized in excess of maintenance that leaves a

profit, the benefits of herd-testing are hereby emphasized.—Victoria (Australia) *Journal of Agriculture*.

NEW WEED EXTERMINATOR.

Wild garlic (*Allium vineale*) has for many years been a serious pest in that belt of territory which extends from Maryland to Missouri. Besides having the usual competitive action of a perennial weed, the plant is harmful in that the bulbils on the stem frequently get intermixed with wheat grain and create an objectionable flavor in the flour. As a weed with fodder crops, this plant may have an effect in causing the tainting of milk.

Considerable attention, therefore, has been directed by the Botanical Department of the Indiana Experiment Station, towards methods for eradicating this noxious weed. A letter in *Science*, for January 3, 1913, states that remarkable results have been obtained by the use of orchard-heating oil as supplied by the Standard Oil Company. It was found that when the oil was distributed over the field in a fine spray by a sufficiently powerful spraying machine, practically all vegetation was killed, not only above ground but below ground as well. It destroyed the bulbs of the wild garlic below ground and the bulbils at the top of the stalks. One or two plants with very large horizontal rootstocks survived, since these required a rather larger dose of oil than was generally applied.

The application of the oil appeared to have no lasting effects on the soil; the new growth from seeds already present in the soil and from subsequently sown cereals possessed the usual vigor.

In considering the trial of this method in the West Indies for exterminating perennial weeds like Devil's grass (*Cynodon Dactylon*) and Nut grass (*Cyperus* sp.) the following questions arise: (1) Will the oil actually kill the hardy rhizomes and tubers of these weeds? (2) Does the oil possess any injurious effect regarding the physical and biological characters of the soil? and (3) What would be the cost per acre?—*Agricultural News*.

PAPER FROM BAMBOO.

Paper from the bamboo cane will soon, says the *Standard*, be of the usual order of things. Scottish engineers are mainly responsible for bringing about this new departure. Not long ago an Edinburgh firm, who specialize in the making of plant for producing paper from bamboo, sent out two complete factory equipments to the Far East—one to convert cane into pulp, and the other to transform that pulp into fine white paper.

On a site near Kagi (Japan) a factory is being installed with every requisite to deal in the first place with only 300 tons of pulp per month, but with room for any development. In this case, however, the pulp will be treated in Formosa, and shipped in rolls or sheets to the paper mills at Kobe; just in the same way as the wood pulp of Norway, Sweden, Russia and Finland is shipped to the United Kingdom to feed the British paper mills. Esparto grass gives way to wood pulp in this country for paper-making purposes, and it is hoped that in the Far East bamboo pulp will enable Eastern mills to compete with the British and American imported paper of the finer qualities. One thing has to be borne in mind—that the process of manufacture from bamboo is a more expensive one than that from wood. Meantime, at any rate, experiments may cheapen the process, and the supply of the cane is practically inexhaustible.

Furthermore, the bamboo is a plant that can readily be cultivated. If any particular species of bamboo is considered the best for paper-making purposes it can easily be grown in any quantity. Asia, Africa, America, and Oceania all have forests of that plant, and a very interesting process is the manufacture of the cane into paper. It is cut up into small pieces of one or two inches, then boiled with sulphate of lime, bleached by electricity, washed, machine rolled, and pressed into tissue form and dried by steam. When wound into rolls or sheets it has a pleasing appearance, and makes an excellent quality of paper.—*L. and C. Express.*

GOATS.

The goat industry is little known in the United States, but there is no sound reason why it should be so. On fifteen thousand square miles, Switzerland raises annually eight million dollars' worth of goats and goat products. America has all the essential conditions of Switzerland in her mountainous regions. In Bavaria, the number of centenarians among the people is noteworthy, and is credited to the fact that there is a large use of goat milk. This milk is very rich and highly digestible, and is recommended for invalids and babies. The goat, itself, is immune from tuberculosis, which is a mighty point in its favor. With millions of acres of brush land lying idle in this country, and with millions of babies clamoring for proper food, the milk-goat industry could doubtless assume monstrous proportions, if a love for the goat could be instilled into our people, especially in those living in mountainous regions.—*The Farmer's Guide.*

ANCESTORS OF POLYPHEMUS.

Who does not know Polyphemus, the one-eyed giant shepherd of whom Homer has something to say in his *Odyssey*? How many of us take the fable in earnest and do not give Ulysses the lie?

But he did not lie. In the course of construction of a railroad in Asia Minor, in the region where Ulysses had his experiences, Italian engineers found giant human bones that could be the remains of none other than the Polyphemus tribe. If you doubt this, write a postal to Signor Antonio Blanco at Schio, Italy, the man who was in charge of the excavation.

Now a new corroboration comes from the Mayo Plantation at Mati, Moro Province, P. I. The acting manager of the plantation, Mr. George Kazdaylevich, who recently arrived at Zamboanga, and who, mind you, is a consistent teetotaler, relates that in the Mati forest a tribe of monkeys live, who are in direct line of descent with Polyphemus. They have only one eye, and it is located in the middle of the forehead. The witness, together with four other men, has seen one of them and tried to catch it, unfortunately without success. The monkey keeps strictly to the forest and jumps to the next tree as soon as he sees an enemy. The natives of the East Coast say they frequently see the one-eyed monkeys. Did they all see the same monkey, or are there really many?

Now the question arises: How could Polyphemus stray so far from his old country? Or is it that the Mati monkey has strayed far from Greece? We leave these deep scientific questions to the Bureau of Science.

Another interesting thing that Mr. Kazdaylevich brings with him is the seed of the Rosella (*Hibiscus Sorbifolia*) that he received from Mexico. While in that country he learned from the native Mexicans how to manufacture from this fruit a most delicious beverage that beggars Welsh's grape juice. Mr. Kazdaylevich is willing to supply seed to those desiring them, together with full instruction in the art of making the pleasing beverage.—Mindanao (P. I.) *Herald*.

COMBATING CUTWORMS.

The poison bran mash is fairly effective in holding cutworms in check. Mix one pound of Paris green or London purple with 25 pounds of bran or middlings. Stir a quart or two of cheap molasses into a gallon of water, moisten the bran, stirring thoroughly until it makes a stiff mash. Apply a heaping teaspoonful near each plant or every two or three feet in the row. Keep fowls away. Apply two or three days before plants are set and apply

the mash in the evening so it will be eaten at night while moist.

It is said that garden plants may be protected from cutworms and flea-beetles by dipping the plants in arsenate of lead, three pounds per barrel of water. The plants are dipped in the solution just before they are transplanted.

Where the worms are very bad, sometimes gardeners knock the bottom out of tin cans and place these around such plants as cabbage, tomatoes, etc. A protection may also be made with building paper. The paper is bent into a cylinder and placed in the soil around the stems of the plants.

A plan that has been satisfactory with us is to take a lantern early in the evening, go into the garden and make war upon the worms with barrel stave or "paddle." The cutworms are usually on the surface or busy eating your plants. It does not take long in this way to destroy the pests in such numbers as to have no further trouble.—*Farm and Ranch*.

NEW EGYPTIAN GRASS GOOD FOR CATTLE.

A late Washington despatch says: Sudan grass, a new drought resistant hay plant, promises to become the leading grass for hay production in the United States, according to C. V. Piper of the Department of Agriculture, who has supervised experimental growths.

The grass is a native of Egypt, suited especially to semi-arid land, grows from four to eight feet high and two to three crops a season. It is preferred by cattle, hogs and horses.

Roland McKee of the agricultural experiment station in Chico experimented with the new plant in 1912 and is enthusiastic concerning its value.

"A fine growth was made," he reports, "and without question this is the most promising grass for growing under irrigation in the Sacramento valley that has yet been tried. The number of cuttings of hay was not determined, as with both plantings a seed crop was allowed to mature, but it seems probable three good cuttings of hay can be made."

The seed was planted at Chico May 2 and two months later the grass was in full bloom and from four to six feet high. It was cut for hay July 15, nine weeks after planting. Reports from Texas, Virginia, North and South Dakota are equally encouraging.

BY AUTHORITY.

**PROCLAMATION OF FOREST RESERVES IN THE DISTRICTS OF
WAIANAE AND WAIALUA, CITY AND COUNTY OF HONO-
LULU, ISLAND OF OAHU, TERRITORY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby recommend and approve as forest reserves to be called respectively the Nanakuli, the Makua-Keeau and the Kuaokala Forest Reserves, those certain pieces of government and privately owned land in the Districts of Waianae and Waialua, Island of Oahu, which may be described roughly as being the upper ends of the valleys bearing those names and the mauka portion of the government land of Kuaokala, and containing respectively areas of 1010 acres, 4716 acres and 434 acres, more or less, in the Districts of Waianae and Waialua, City and County of Honolulu, Island of Oahu, Territory of Hawaii, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked respectively Government Survey Registered Maps No. 2535, "Nanakuli Forest Reserve," No. 2407 "Makua-Keeau Forest Reserve," and No. 2532, "Kuaokala Forest Reserve," and descriptions accompanying the same, numbered respectively C. S. F. Nos. 2366, 2396 and 2364, which said descriptions now on file in the said Survey Department are as follows:

NANAKULI FOREST RESERVE.

Waianae, Oahu.

C. S. F. No. 2366.

Beginning at Government Survey Trig. Station "Manawahua" on the ridge separating the lands of Nanakuli and Honouliuli, as shown on Government Survey Registered Map No. 2535, and running by true azimuths:

1. Along down the ridge separating the lands of Nanakuli and Honouliuli to an iron pipe at the West corner of the proposed Honouliuli Forest Reserve the direct azimuth and distance being 67° 08' 4420.0 feet;
2. 231° 26' 30" 2179.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
3. 202° 46' 1441.0 feet along Nanakuli pasture land to a pipe on ridge;
4. 144° 20' 1519.0 feet along Nanakuli pasture land to a forest reserve monument on ridge;
5. 97° 07' 1970.0 feet along Nanakuli pasture land to a pipe on end of spur;
6. 215° 02' 30" 2642.0 feet along Nanakuli pasture land to a pipe on end of spur;
7. 308° 19' 30" 1108.5 feet along Nanakuli pasture land to a forest reserve monument on spur;
8. 251° 24' 1784.7 feet along Nanakuli pasture land to a pipe on small spur;
9. 209° 14' 30" 1452.8 feet along Nanakuli pasture land to a pipe on small spur;
10. 224° 59' 1094.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;

11. 132° 03' 30" 1018.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;
12. 92° 49' 1118.4 feet along Nanakuli pasture land to a forest reserve monument on spur;
13. 145° 39' 2333.8 feet along Nanakuli pasture land to a pipe on small spur;
14. 85° 50' 30" 1263.5 feet along Nanakuli pasture land to a forest reserve monument on small spur;
15. 38° 09' 30" 1973.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
16. 66° 43' 4786.0 feet along Nanakuli pasture land to Haleakala Peak on the ridge separating the lands of Nanakuli and Lualualei, said peak being the south corner of the Lualualei Forest Reserve;
17. Thence up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, the direct azimuth and distance being 226° 58' 30" 6176.4 feet;
18. Thence still up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, to a peak called Palikea, at the intersection of the ridges forming the boundaries of the lands of Lualualei, Nanakuli and Honouliuli, the direct azimuth and distance being 267° 10' 6280.0 feet;
19. Thence down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli forest reserve, the direct azimuth and distance being 350° 25' 4505.0 feet to a peak called Mauna Kapu;
20. Thence still down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli Forest Reserve, the direct azimuth and distance being 22° 31' 6219.0 feet to the point of beginning.
Area 1010 acres.

MAKUA-KEAAU FOREST RESERVE.

District of Waianae, Island of Oahu.

C. S. F. No. 2396.

Beginning at a 1½ inch pipe at the base of pali on the boundary between Keaau and Makaha, the coordinates of said pipe referred to Government Survey Trig. Station "Kepuhi" being 2278.5 feet North and 462.0 feet West, and the true azimuth to a + in coral rock at sea on the boundary between Keaau and Makaha being 69° 58' distance 1263.7 feet, as shown on Government Survey Registered Map No. 2407, and running by true azimuths:

1. Along the base of the pali to a 1½ inch pipe on rocky ledge, the direct azimuth and distance being 192° 13' 2926.0 feet;
2. 170° 32' 1355.5 feet to a 1½ inch pipe on rocky point;
3. 219° 05' 911.7 feet to a 1½ inch pipe;
4. 173° 32' 976.7 feet to a 1½ inch pipe on rocky point;
5. 217° 46' 1314.5 feet to a + on solid rock;
6. 288° 16' 3693.0 feet to a 1½ inch pipe;
7. 270° 53' 1831.0 feet to a 1½ inch pipe;
8. 176° 25' 2766.0 feet across Keaau Valley to a 1½ inch pipe;
9. 115° 40' 1302.5 feet across the land of Ohikilolo to a 1½ inch pipe;
10. 104° 43' 2210.0 feet to a 1½ inch pipe on spur;
11. 121° 50' 3861.0 feet to a 1½ inch pipe at the base of pali;
12. Thence along base of pali crossing Ohikilolo-Makua boundary to a 1½ inch pipe on spur in Makua Valley, the direct azimuth and distance being 196° 42' 2116.0 feet;
13. 288° 00' 3931.3 feet to a 1½ inch pipe at small pali at end of fence;

14. Thence along fence and wall, the direct azimuth and distance being 179° 46' 915.0 feet;
 15. 247° 37' 346.0 feet on spur to a 1½ inch pipe;
 16. 274° 46' 5052.8 feet to a 1½ inch pipe;
 17. 259° 46' 30" 880.3 feet to a 1½ inch pipe;
 18. 202° 26' 3811.1 feet across Makua Valley to a 1½ inch pipe;
 19. 72° 00' 2237.2 feet to a 1½ inch pipe;
 20. 104° 06' 30" 5471.3 feet to a 1½ inch pipe on spur, being the boundary between Makua and Kahanahaiki;
 21. 204° 00' 2645.5 feet to a + on large solid rock;
 22. 158° 34' 1788.5 feet to a 1½ inch pipe on small spur;
 23. 70° 11' 30" 2632.0 feet to a 1½ inch pipe on spur;
 24. 70° 50' 2774.5 feet to a 1½ inch pipe on pali point;
 25. Thence across Kahanahaiki along the base of pali to a + on solid rock on the boundary between Keawaula and Kahanahaiki, the direct azimuth and distance being: 135° 33' 3868.0 feet;
 26. Thence up center of ridge along Keawaula, and thence along center of the main Waianae Range along Kuaokala, Kealia, Kawaihapai, and Mokuleia, to the junction of the Makua, Mokuleia, and Makaha boundaries, the direct azimuth and distance being: 295° 00' 23320.0 feet;
 27. Thence down center of ridge dividing Makaha and Keaau to the point of beginning, the direct azimuth and distance being: 55° 12' 21480.0 feet;
- Total area 4716 acres.

KUAOKALA FOREST RESERVE.

Waialua District, Island of Oahu.

C. S. F. No. 2364.

C. S. R. Map No. 2532.

Beginning at Government Survey Trig. Station "Hakakoa" and running by true azimuths:

1. 169° 50' 711.5 feet along government land to fence corner;
2. 80° 14' 1927.5 feet along government land;
3. 62° 43' 30" 798.8 feet along government land to a 1 inch iron pin;
4. 152° 22' 30" 1194.2 feet along government land to a 3 x 3 redwood post;
5. 121° 26' 1727.4 feet along government land to a 3 x 3 redwood post;
6. 125° 17' 30" 2462.2 feet along government land to a 3 x 3 redwood post;
7. 58° 54' 601.8 feet along government land;
8. 2° 15' 1209.5 feet along government land to a 1½ inch iron pin;
9. 328° 43' 40" feet along government land to an iron pin;
10. 307° 23' 40" 1623.3 feet along government land;
11. 201° 03' 40" 945.1 feet along government land;
12. 295° 00' 2852.2 feet along government land;
13. 269° 59' 993.9 feet along government land;
14. 207° 49' 1348.0 feet along government land;
15. 173° 00' 900.0 feet to the point of beginning.

Area 434 acres.

And as provided by law, subject to the existing leases, I do hereby set apart as the Nanakuli Forest Reserve that portion of the Government land of Nanakuli (1010 acres) that lies within the metes and bounds of the above described Nanakuli Forest Reserve; as parts of the Makua-Keaau Forest Reserve those portions of the government lands of Keaau (1850 acres), Makua (1556 acres) and Kahanahaiki (970 acres),

altogether an area of 4376 acres, more or less, that lie within the metes and bounds of the above described Makua-Keaau Forest Reserve; and as the Kuaokala Forest Reserve those portions of the government lands of Kuaokala (Kaena) and Keawaula (434 acres) that lie within the metes and bounds of the Kuaokala Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu, this 4th day of June, A. D. 1913.

W. F. FREAR,
Governor of Hawaii.

By the Governor:

E. A. MOTT-SMITH,
Secretary of Hawaii.

Hawaiian Gazette Co.

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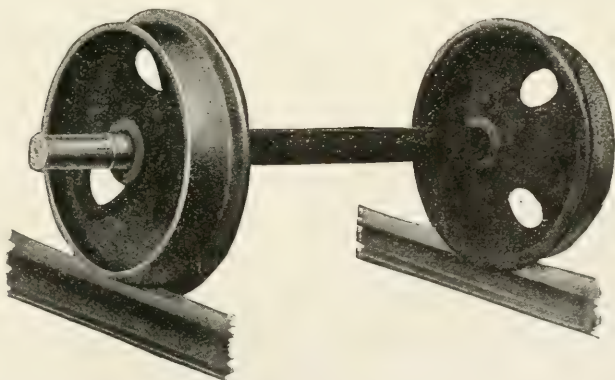
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Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
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- Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
- Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications

**SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207
HONOLULU, HAWAII**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

JULY, 1913.

No. 7.

Some idea of what the Territory of Hawaii owes to the Division of Animal Industry may be obtained from a perusal of the monthly reports thereof in this number. The promptness with which suppressive and preventive measures are taken whenever any disease among live stock is reported saves many thousands of dollars of loss every year. It is very gratifying, also, to have evidence that the methods of the official veterinarians exemplify the latest word in scientific practice.

It would be impossible to imagine, after considering the reports from month to month of the Division of Entomology, what the condition of agriculture in Hawaii would be were the constant fight to exclude and exterminate pests suspended even for one month.

Attention is directed to the notice by Mr. Hosmer of the bulletin on Hawaiian names of plants and the book on indigenous trees of Hawaii, both written by Mr. Rock.

"The aim of the Division of Forestry," Mr. Hosmer says in his June report, "is to be of direct and practical use to the people of the Territory." This none can gainsay who have knowledge of the progress made in forestry in these islands since the small practical beginning made in governmental forestation a little over a quarter of a century ago, the greatest strides having been made since Mr. Hosmer, subsequent to annexation, placed the work on a scientific basis. Prior to that time, however, the sugar planters were taking a lively interest in tree planting, as a result of which there are many fine growths of forest throughout the islands. How their interest continues is evidenced by the demands they are making on the government nursery, of which the 16,000 plants taken by them in June last past constitute but an ordinary monthly incident. In the Eastern States just now municipalities are planting forests with the expectation of returns in due time which will do away with the necessity of civic taxation. If that can be done there, what possibilities of forestry are not present in Hawaii, where the growth of trees is so much more rapid?

In this issue the publication is begun of a treatise on "The Kalo in Hawaii," of which Professor MacCaughey and Mr. Joseph Emerson are the authors in collaboration, the former as botanist and the latter as historian. Judging by the introductory chapter forming the first instalment, the brochure is one that will attract much interest at home and abroad.

An article in this number on "Insect Control," by C. R. Jones, the Philippine entomologist, seems to contain much matter of useful applicability to Hawaii.

Various short selected articles, relating to diversified agriculture of kinds already existent in Hawaii or adapted to its soil and climate, will be found in this number.

A review of a bulletin of the experiment station of the University of Illinois, on tubercle bacilli, appears in this number, which ought to be of much local interest in view of the campaign against bovine tuberculosis which has been so successfully established on the Island of Oahu and must in time be extended to cover the whole group.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, June 30, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to present herewith the report for the Division of Animal Industry for the month of June, 1913:

ANIMAL QUARANTINE STATION, HONOLULU.

The complete reconstruction and enlargement of the Station which has been under way for the past three months has been finished. The main parts of this work come under the following heads:

(1) *Dog Quarantine Section.* As already reported, six additional enclosures were provided, making a total of 24 individual enclosures, more than half of which can be made to hold two or more dogs, if the same belong to one owner or arrive approximately at the same time. The most important improvement, however, is the reinforcement of all the enclosures with a concrete embankment 12 to 18 inches wide along the inside of the foot boards, making it impossible for an animal to dig out and escape. This arrangement in no way detracts from the sanitation of the pens,

as the main part of the enclosure remains unchanged; that is, the original beach sand through which all excretions likely to contaminate the kennels may percolate to the tide water below. (2) The horse and mule section has now been completely rebuilt, the number of posts in the fences being almost doubled, so that the distance between them in no case exceeds eight feet. The stability has also been greatly increased by connecting all the posts with a 2"x4" stringer spiked to the top. This will prevent the animals from "riding" on the fence and will thereby double the life of the enclosures. All gates have been reinforced and rehung and a mixture of oil and sand applied to all woodwork exposed to the teeth of the animals.

A small chamber 9'x12' has been added to the office so that the keeper may have a place to sleep and keep his clothes, for which purpose the office has hitherto had to serve.

HILO QUARANTINE STATION.

Dr. Elliot reports progress with the construction of this station, though the contractor has had trouble with his laborers. He seems, however, to be satisfied with the work so far as it has gone, and expects the station to be finished by the latter part of July. He further recommends that the keeper, when he secures one, be provided with some tools—spade, shovel, pick, wheelbarrow, etc.—so that he can put him to work gathering rock for the road and stable floors.

HOG CHOLERA.

As previously reported, this disease has spread to a considerable extent and many animals have died. The method of control now in vogue in the States—the injection, subcutaneously, of blood serum obtained from hogs which have been hyperimmunized against the disease—has been applied here and with seeming success; in fact, with highly satisfactory results. It may, for instance, be mentioned that in one herd of 20 to 40 animals of all sizes, and all of which were affected with the disease, some to such an extent that they could not walk, practically every one which was inoculated has either recovered or else improved, while two, which escaped inoculation by breaking through the fence, developed the disease and one of them has died, while none of the treated hogs have been lost.

The establishment of a serum institute for the manufacture of hog cholera serum here has been considered in view of the price asked for the commercial serum, which amounts to from two to three dollars for full-grown hogs. There is, however, considerable danger of spreading or perpetuating the disease here, as it is necessary to keep on hand animals infected with the most virulent

form of the disease, and in view of the limited number of hogs in the Islands the cost of manufacturing the serum here would no doubt prove exorbitant.

Special inquiries in regard to the prevalence of this disease on the other islands have been directed to the deputies of this office, but from the replies received it would appear that the present outbreak is confined to the Island of Oahu. It is therefore recommended that a regulation be promulgated at once prohibiting the shipment of hogs from Oahu to any of the other islands, temporarily. If this is approved by the Board, I would respectfully recommend that the appended Rule be acted upon at once. As the disease seems to have spread over the entire Island of Oahu, even as far as Waimea and Kahuku, it does not seem possible that anything can be accomplished by regulations prohibiting the transfer, interchange or shipping of hogs from one port of this island to another. On the other hand, it would be advisable to call the attention of the Board of Health and the Board of Supervisors to the fact that hog cholera is prevalent and that the respective Boards take steps to protect the public against the marketing and consumption of pork from hogs which have not passed a rigid ante, as well as post-mortem, inspection, such as is required by the Federal Bureau of Animal Industry. These regulations are plain and to the point, without being onerous, and as it was intimated to me only yesterday that pork had been offered for sale at ridiculously low prices, it is safe to conclude that such pork originated from pigs that had died from cholera. The disease is, however, not transmissible to human beings, nor to any of the other domesticated animals, for which reason the federal regulations permit the marketing of hogs exposed to the infection and allow the consumption of the pork so long as the animals have not developed the disease to such an advanced degree as to affect the wholesomeness of the pork.

“Territory of Hawaii, Board of Agriculture and Forestry, Division of Animal Industry.

“Rule VII: Prohibiting the shipment, transfer or exchange of hogs from the Island of Oahu to any other island of the Territory of Hawaii.

“It having come to the notice of this Board that a disease known as hog cholera or swine plague is prevalent among the hogs on the Island of Oahu, it is hereby ordered:

“Section 1. Until further notice no hogs (of whatsoever age, breed, or description) shall be shipped, carried or transferred from the Island of Oahu to any other island of the Territory of Hawaii.

“Section 2. This order shall take effect upon its approval by the Governor.”

CEREBRO SPINAL MENINGITIS.

This highly fatal disease among horses and mules has fortunately not spread to the extent that it was feared might result from the heavy rains following a prolonged drought. The outbreak at Fort Shafter resulting in the death of four mules may possibly be ascribed to some other cause, that is, poisoning with a weed contained in the hay (imported from California) which was being fed to these animals at the time of their death. Fortunately some of this hay was secured, and as will be seen from the appended letter from Mr. Rock, botanist to the College of Hawaii, the hay contains not less than ten per cent. of the poisonous weed in question. What remains of the bale, about 40 lbs., is being fed to a mule in order to ascertain whether the weed in question could have been the direct cause of the death of these four mules.

On the other hand, Dr. Fitzgerald reports an extensive outbreak of cerebro-spinal meningitis on the Island of Molokai, with 30 or 40 animals affected with about ten deaths. He also reports a number of scattered cases of the same disease on the Island of Maui. From Hawaii and Kauai no definite information has been received, so it is to be presumed that, for the present at least, the danger of a severe outbreak seems to have passed.

RABIES AND HYDROPHOBIA.

The newspapers from California and adjoining states and the official reports of live stock commissions and live stock sanitary boards indicate that this disease is far from being suppressed, and the number of human beings, especially children, reported to have been bitten by mad dogs seems to be constantly increasing. On top of that it appears that the health authorities of San Francisco have been prevailed upon to rescind the muzzling act, on account of the hot weather, and substituting it with an order that all dogs must be in leash when on public highways or streets. This is the same fatal mistake that has perpetuated the disease in so many other countries, causing numbers of deaths and untold suffering. Only those countries which have enforced the continuous muzzling of all dogs in public places, in connection with stringent quarantine of all imported dogs, have succeeded in exterminating the disease. From personal observations for the past twenty years I feel convinced that this abrogation of the muzzling act in San Francisco will result in an immediate increase in the number of cases of rabies, and it consequently becomes necessary for us to increase our vigilance against the disease gaining an entrance here. For this reason I have to express my appreciation of the support of the Board in perfecting the dog quarantine station to a point where even the most fastidious cannot raise a single

objection to the detention of their dogs for a period which to many seems exorbitant and unnecessary.

Very respectfully,

V. A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 28, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith my report for the month of June, 1913:

Tuberculosis Control.

The appointment of Mr. Richards, past city and county milk inspector, as assistant to this division by the Board of Commissioners, has enabled us to take up again the tuberculin testing of dairy cows as required by the municipal milk ordinance. The fourth general test of the dairy herds of the city and county of Honolulu has now commenced and is progressing rapidly. Since June 9 twenty-nine (29) dairies have been visited and a total of one thousand one hundred and thirty-two (1132) animals subjected to the test, out of which number, as far as we are able to report at the present time, 49 cows have been condemned. The following tabulated list gives the name of each dairy visited, with the total number of animals tested, passed and condemned in each:

| | T. | P. | C. |
|---------------------------------|-----|-----|----|
| June 9-12—Joe Gouviera | 41 | 40 | 1 |
| N. B. Brown | 39 | 39 | 0 |
| M. Salina | 30 | 28 | 2 |
| J. W. L. McGuire..... | 20 | 19 | 1 |
| S. I. Shaw..... | 22 | 22 | 0 |
| S. T. Grace..... | 7 | 7 | 0 |
| Waialae Dairy | 59 | 55 | 4 |
| Chas. Lucas | 29 | 29 | 0 |
| June 13-16—Waialae Dairy | 234 | 226 | 8 |
| R. Compos | 79 | 74 | 5 |
| June 14-17—Chas. Lucas | 53 | 46 | 7 |
| June 17-19—Jose Gonzallas | 35 | 33 | 2 |
| R. A. Franco | 20 | 19 | 1 |
| Nishimoto | 10 | 10 | 0 |
| M. M. Pedro..... | 20 | 20 | 0 |
| June 18-21—J. M. Whitney..... | 13 | 12 | 1 |
| J. H. Cummings..... | 6 | 6 | 0 |
| W. E. Wall..... | 13 | 12 | 1 |

| | | | | |
|-------------|------------------------|-----|-----|---|
| June 20-23— | Waialae Dairy | 128 | 121 | 7 |
| | W. P. Alexander..... | 5 | 5 | 0 |
| June 23-26— | J. H. Cummings..... | 1 | 1 | 0 |
| | W. E. Wall..... | 1 | 1 | 0 |
| | I. Nagaki | 22 | 21 | 1 |
| | H. E. Cooper..... | 19 | 19 | 0 |
| June 24-27— | T. F. Farm..... | 73 | 68 | 5 |
| | F. Medieros | 20 | 20 | 0 |
| | P. Miyakawa | 15 | 15 | 0 |
| | K. Inouye | 14 | 14 | 0 |
| | K. Yamashita | 17 | 17 | 0 |
| | M. K. Young..... | 15 | 14 | 1 |
| | S. Hirata | 20 | 20 | 0 |
| June 25-28— | Oahu College | 15 | 15 | 0 |
| | Mills Institute | 18 | 18 | 0 |
| | College of Hawaii..... | 19 | 17 | 2 |

It is very encouraging to note that considerable improvement has taken place in Mr. Isenberg's herd in the last five months. In January, 1913, a total of 470 animals were tested at Waialae and 63 condemned, the percentage of diseased animals being 13.4%. This month a total of 421 animals were tested and 19 condemned, the percentage of diseased animals being 4.5, which is a very great improvement. Under the efficient management of the ranch at the present time, where thorough disinfection of all barns is immediate, and absolute segregation and early slaughter of all condemned animals is practiced, improvement in the herd is bound to be rapid. Mr. Isenberg is to be congratulated on the consistent way in which he has fought this disease, which was present to such an alarming extent in his herd four years ago, and on the good results which are now being realized.

I have been fortunate enough to be able to make post-mortem examinations on four cows condemned on this test and have found all affected with the disease to a greater or lesser extent. The results of these examinations are as follows:

One cow from Joe Gouviera's herd. The animal was in fine condition; the reaction was large and of a typical character. Post-mortem lesions of the disease consisted of a few small nodules in the bronco-esophageal glands; all other organs in the body clean.

Three cows from Charles Lucas' dairy were killed at one of the local slaughter houses, resulting as follows:

No. 1. Condemned on the 17th and slaughtered on the 19th. Swelling at point of inoculation still present. The presence of the disease was shown by a few small nodules in the sub-lumbar lymph glands; all other organs in the body clean.

No. 2. Swelling at point of inoculation still present; retro-pharyngeal glands contained a few small nodules; diaphragm-

atic lobes of the lungs contained three tuberculous abscesses, one of which was double the size of the closed hand. All contained the characteristic gritty pus.

No. 3. Swelling at point of inoculation still present. Disease present in the left retro-pharyngeal gland, which was greatly enlarged, measuring 5" long and 3" wide and filled with tuberculous pus. All other organs in the body clean.

In all of the above animals the disease was of a localized nature and the carcasses in fine condition, and the meat was therefore passed for food. As has been noticed before, the size of the local swelling constituting a reaction has no definite relation to the amount of disease in the animal body, as sometimes a very pronounced reaction will be observed when the lesions are small and few in number. There is no doubt that there is nothing constant in the size of swelling, and that an animal may at one time give a pronounced reaction and at another time a swelling half the size. The degree of reaction varies as the anaphylaxis of the animal tissues is of a high or low degree, and this degree cannot at all times express correctly the amount or stage of the disease, as it is conceivable that when first infected and when the disease is becoming established the tissues of the body would be in a highly sensitive state, and the injection of the toxins in the tuberculin cause a violent reaction and the following post-mortem examination would have to be careful indeed to discover the seat of the lesions.

The anaphylaxis brought about by the presence of the disease in the various organs of the body will vary as the vitality of the system varies and whether the disease is in a quiescent or active stage. It is probable that when the disease is extensive in the body the anaphylactic properties of the disease, the skin in particular, are much lowered, and as the disease progresses become less and less until at times it is entirely nil, and this condition may last for greater or lesser periods of time. Thus it is conceivable that such an animal would not give a reaction to the toxins injected and so pass the tuberculin test when extensively affected with the disease.

The post-mortem examinations I have been fortunate enough to make since the intradermal method was inaugurated have been positive; that is, the disease has been present in every case. On the other hand, I have learned of examinations being made on condemned animals where no lesions have been found. In establishing a method of testing, negative findings are as valuable as those cases which are of a positive nature. From the results thus far experienced in the use of this method, we are still firmly convinced of the great value of the intradermal method and of its equal reliability to the subcutaneous test, which has been demonstrated to be reliable in 98.36 per cent. of cases.

The following list of live stock was allowed to enter the port of Honolulu during the past month:

June 4—S. S. Korea, San Francisco: 1 dog, Lieut. H. S. Green; 1 crate Bl. Plymouth Rocks.

June 5—S. S. Ascot, Europe: 5 cats, immigrants.

June 9—S. S. Sonoma, San Francisco: 1 crate guinea hens.

June 10—S. S. Wilhelmina, San Francisco: 4 crates poultry; 1 dog, W. P. Reeves.

June 16—S. S. Chiyo Maru, Orient: 1 dog, Capt. Bennett; 1 crate Japanese game.

June 17—S. S. Honolulan, San Francisco: 15 horses, 2 mules, 1 colt, D. Ferriera; 4 horses, 22 mules, 1 bulldog, Schuman Carriage Company; 1 bulldog, Capt. C. W. Waller; 7 crates chickens, N. B. Lansing.

June 17—S. S. Virginian, Seattle: 24 mules, Chas. Bellina; 39 horses, 2 sheep, 16 pigs, 2 cows, A. L. McPherson.

June 18—S. S. Siberia, San Francisco: 1 Boston bull terrier pup, Carl T. Schaefer.

June 18—S. S. Niagara, Vancouver: 1 white boar, T. H. Davies & Co.

June 23—S. S. Sierra, San Francisco: 49 crates poultry.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, June 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of June as follows:

During the month 39 vessels arrived at the port of Honolulu, of which 21 carried vegetable matter and one vessel moulding sand.

| Disposal. | Lots. | Parcels. |
|--------------------------------|-------|----------|
| Passed as free from pests..... | 1129 | 16,929 |
| Fumigated | 11 | 32 |
| Burned | 65 | 74 |
| Prohibited from entry..... | 1 | 1 |
| Total inspected | 1206 | 17,036 |

Of these shipments, 16,282 packages arrived as freight, 84 packages by mail and 670 packages in the baggage of passengers

RICE.

During the month 21,876 bags of rice arrived from Japan. All the various lots were examined and found free from pests and were then released. All the rice had been fumigated at Kobe.

PESTS INTERCEPTED.

Twenty packages of fruit and 45 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, as well as those which arrived from Spain on the steamer Ascot. Of the latter each piece of baggage was carefully searched for seeds which were thoroughly examined and fumigated. Several lots, being badly infested, were burned. Four large baskets of sweet potatoes from Hongkong were found infested with the sweet potato weevil and were ordered destroyed. A small lot of beans from Manila in the mail was found infested with the Chinese bean weevil (*Bruchus chinensis*) and was fumigated before being released. Two orchids badly infested with mealy bugs and the orchid scale (*Chrysomphalus bififormis*) were destroyed. An ants' nest with many young larvae and pupae was found in a bale of moss coming from England. The shipment, consisting of three large bales, was fumigated for 48 hours with carbon bisulphide and after the treatment we found the ants dead. A small package of native limes from Australia was found in the mail. The fruits were infested by a few caterpillars feeding on the peel. As these were sent for experimental purposes to the U. S. Experiment Station, we saved the seeds, put out fruit in alcohol for a sample and destroyed the pulp of the other fruits.

BENEFICIAL INSECTS.

One lot of *Colosoma* beetles was sent to the Division of Entomology by Dr. A. F. Burgess of the Gypsy moth laboratory, Melrose Highlands, Massachusetts. This is the fourth sending we have received and from this lot of 25 beetles, eight were liberated up Manoa Valley, where one of the 1912 sendings was placed. The *Colosoma* beetles are of great benefit, as they feed on cutworms and the larvae of many injurious insects. It is doubtful whether or not the beetles will become established owing to the great difference in climate.

Two packages of parasitized aphids came to Mr. O. H. Swezey of the H. S. P. A. Experiment Station from Mr. Fred Muir, also of the H. S. P. A. Experiment Station, and before these were passed they were opened in my presence. I understand that Mr. Swezey has been able to liberate quite a few parasites, which, if they become established, will no doubt assist in keeping in check some of the aphids which infest our vegetable and flowering plants.

HILO INSPECTION.

Brother M. Newell reports the arrival of nine vessels, five of which brought vegetable matter consisting of 107 lots and 1866 parcels. Seven bags of pineapple plants were inspected and fumigated before shipment from Hilo to Maui; they were slightly infested with mealybugs.

INTER-ISLAND INSPECTION.

During the month of June 56 steamers were attended to and the following shipments were passed:

| | | |
|--------------------|-----|----------|
| Plants | 64 | packages |
| Taro | 649 | bags |
| Fruit | 23 | packages |
| Lilyroot | 15 | " |

Total passed..... 751

The following packages were refused shipment:

| | | |
|--|----|----------|
| Fruit (on account of infestation)..... | 20 | packages |
| Plants (on account of soil and infestation)... | 6 | " |

Total refused shipment..... 26 "

STAFF.

On June 3 Mr. J. C. Bridwell arrived from the Coast to act as assistant superintendent of entomology, and is now assisting in the breeding of the parasites of the Mediterranean fruit fly.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, June 30, 1913.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for June, 1913:

FOREST RESERVES.

On June 4, Governor Frear signed a proclamation creating three forest reserves in the Waianae District—Oahu-Nanakuli, Makua-Keaau, and Kuaokala—of which mention was made in my May report.

During this month there have been submitted to the Board reports recommending the setting apart as forest reserves (1) of the watershed on the mountains immediately back of Honolulu, (2) of the Waiakea-Olaa forest on Hawaii, (3) of the summit of the Kohala Mountain, Hawaii, with certain adjoining lands, and (4) a modification of boundary in the Moloaa Forest Reserve on Kauai.

HAUULA FOREST FENCE.

On June 25 I visited the Government land of Hauula in the Koolauloa District on this island, in company with representatives of the Hauula Homesteaders' Association, went over the ground and flagged the line of the proposed forest fence across the mauka portion of this land, on the location approved by Governor Frear in May, 1913.

PREPARATIONS FOR THE COMING FISCAL PERIOD.

Not a little time during June has been given to preparing detailed plans and outlines for the forest work to be carried on during the fiscal period beginning July 1, especially with reference to the fencing of forest reserve boundaries on Government land. In addition to thus providing for better protection for the native forest, it is the intention of the Division of Forestry to continue its regular work of growing and distributing trees from its several nurseries and of giving information and advice on forest matters, along the lines that it has followed in the past few years. The aim of the Division of Forestry is to be of direct and practical use to the people of the Territory. The calls that are made on this office prove that there is an active demand for such service.

BOTANICAL BULLETIN.

At the end of the month there was issued as Botanical Bulletin No. 2, a "List of Hawaiian Names of Plants," by J. F. Rock, consulting botanist of the Board of Agriculture and Forestry. This is a twenty-page pamphlet giving the Hawaiian, the botanical, and, where there is one, the English name of a large number of indigenous trees and shrubs. An edition of 1500 copies was struck off.

In this connection it may not be out of place to make mention of the appearance on June 26 of Mr. J. F. Rock's book, "The Indigenous Trees of the Hawaiian Islands." This volume gives technical and popular descriptions of over 400 trees, many of which are illustrated by excellent full-page plates from photographs taken by Mr. Rock. The more technical part of the book is preceded by a general account of the forests and forest types in Hawaii that add much to its value.

A good part of the botanical material on which the descriptions are based was collected by Mr. Rock while actively a member of the staff of this Board. The original specimens are in the Herbarium of the Board, now on deposit with the College of Hawaii.

Mr. Rock's book is not only a highly important scientific contribution; it is as well a work which can be used to advantage and with satisfaction by the general public. Issued under the patronage of subscribers, the book is now on sale in Honolulu.

NURSERY NOTES.

During June a new soil sterilizer has been installed at the Experiment Garden in Makiki Valley. At the Government Nursery the remodeling of the stable buildings has been completed, along with the relocation and repair of some of the other smaller service buildings. I transmit, as usual, the report of the Forest Nurseryman.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of June:

Nursery.

Distribution of Trees.

| | In Seed Boxes. | In Boxes Transplanted. | Pot Grown. | Total. |
|--------------|-------------------|---------------------------|---------------|--------|
| Sold ..... | .... | ... | 113 | 113 |
| Gratis | 3000 | 410 | 425 | 3835 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| Total | 3000 | 410 | 538 | 3948 |

Collections.

| | |
|--|---------|
| Collections on account of plants sold amounted to..... | \$ 2.25 |
| Rent of building, Nursery grounds..... | 35.00 |
| | <hr/> |
| Total | \$37.25 |

Plantation Companies and Other Corporations.

The distribution of plants as per heading amounted to 10,000 in seed boxes, 5000 in transplant boxes, and 1000 pot grown. Total, 16,000.

For a few months during the summer the distribution of plants is always small and we are therefore able to do some needed repairs to buildings, etc., with our own men. In addition to assisting in the remodeling of buildings at the Nursery, we have commenced to repair the forestry cottage on Tantalus. This cottage has been in a disreputable condition for a number of years and an eyesore to people passing that way. A couple of weeks' work with our own men will put it in good condition.

The pest known as Jerusalem Thorn (*Parkinsonia Aculeata*), which was discovered about a year ago growing on Quarantine Island, has been all dug up and burned. A gang of prisoners kindly granted by Sheriff Henry did the work.

Experiment Garden, Makiki.

The new soil sterilizer has been installed and is a great success. The saving of fuel and labor when compared with the old one justifies the expense that has been put on it.

A large stock of plants is being propagated for the fall planting.

U. S. Experiment Planting, Nuuanu Valley.

The man has been transplanting into tin cans more new varieties of Eucalyptus, also hoeing and attending to the plats already planted.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

THE KALO IN HAWAII. (I.)

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

PREFACE.

The material in the following pages has been gathered by the authors from personal observations of kalo production, from extended conferences with many Hawaiian "taro-planters," and from a survey of important literature.

So far as is known, this is the first comprehensive collaboration of information relative to the Hawaiian kalo. It has been prepared with the hope that it may serve as a basis for research work. The Hawaiian kalo is a plant of great ethnologic and agricultural interest. It deserves far more attention than has yet been ac-

corded it. These articles may indicate a few of the many approaches towards this plant of venerable antiquity.

The name *kalo* is used throughout this series, in preference to the modernly-used *taro*. The authors felt that this plant should be designated by its original and authentic Hawaiian name.* The authors realize the many gaps and incompletenesses that necessarily characterize a series of this nature. Many of the topics are treated suggestively—for example, an exhaustive study of the mythology of Hawaiian *kalo* is yet to be made. This series is to be considered as a reconnoissance.

1. INTRODUCTION.

The *kalo* is one of the most important food plants utilized by the human race. Together with its immediate relatives, it has been intensively cultivated by peoples of the tropics and subtropics since the dawn of man's dominion over nature. *Kalo* has always been the chief food of the Hawaiian race, and of many other peoples of Oceanica.

At this point attention may be properly directed to some of the salient features of the Hawaiian Islands and the Hawaiian people, with special reference to *kalo* production.

The Territory of Hawaii consists of an archipelago two thousand miles long, in the North Pacific Ocean. It is 2100 miles west of San Francisco and 4700 miles east of Manila. These islands were discovered by Captain Cook in 1778. The land surface of the eight inhabited islands aggregates about 6500 square miles, being a little less than the State of New Jersey. The largest island, Hawaii, has an area about the same as Connecticut.

To the northwest of the larger islands lies a series of tiny coral atolls and barren rocks, the majority of them scarcely rising above the surface of the sea. These have a combined area of less than six square miles, and are of no agricultural significance, save as sources of guano.

This chain of islands is of volcanic origin. Volcanic activity has evidently moved southeastward along well-defined fissures. The smaller, most deeply-eroded islands, having fewest traces of recent volcanic action, are to the northwest, while to the southeast they are larger, less eroded, with fresh lava flows and other indications of late eruptions. Indeed, on Hawaii itself, the largest and most southerly of the islands, are the two great active volcanoes, Kilauea and Mauna Loa. On this island lava-flows and other volcanic phenomena occur at relatively frequent intervals.

The four million acres that comprise the land area of Hawaii are of the following types: waste land, 32%; forest land, 25%; grazing land, 33%; arable land, 6%; reclaimable land, 4%. Water

* *Kalo* and *taro* are merely dialectic variations of the same word.

supply and altitude are the chief factors in the productivity of the agricultural lands. Of the arable land, the most valuable is that having water rights and utilized by the kalo, rice, and sugar plantations. This aggregates about 213,000 acres, on the alluvial flats and lower slopes. Above or adjacent to these areas is a belt, aggregating 1,500,000 acres, too high or too dry for sugar-cane, and so used for grazing.* Higher up on the mountain slopes, in many places extending well up towards the summits, are the forests, which constitute invaluable water reserves for the lower lands.

The lands of Hawaii are owned as follows: Public lands, 40%; corporately owned (chiefly sugar and pineapple plantations), 39%; individual Americans, 10%; individual Hawaiians and part-Hawaiians, 9%; individual Asiatics, 2%. The land was owned at one time entirely by the Hawaiian aborigines, who were pre-eminently farmers, and who developed a highly intensive system of cultivation. Arable land and available water were utilized to a maximum degree. The food supply of the early Hawaiians came almost wholly from the fertile lowlands that engirdle the islands, and from the bounteous ocean. Kalo, sweet potatoes, yams, bread-fruit, bananas, coconuts, sugar cane, and wild fruits constituted their vegetable food. Fish, swine, fowl and dog supplied the remainder of their diet. The pounded corm of the kalo, forming a starchy and acetic paste called *poi*, was their "staff of life," and "Fish and poi" is still a by-word for a meal.

"The limited area of the islands restricted nomadism; the entire lack of big game cut off hunting; and the absence of grazing domestic animals prevented pastoral life." Thus this peaceful, kindly people became, by force of circumstance, skilful farmers. Their ancient practices are unfortunately decadent, and little survives but deserted kalo patches, neglected groves of bananas, and slow-dying coconut plantations, to tell of the minute system that once drew tribute from every foot of good land, and was so marvelously adapted to local conditions.

During the middle of the last century there were about 11,000 native landowners, each occupying and tilling minute "*kuleanas*" of from a fraction of an acre to three acres in extent. "This division of the land illustrates the fact that the needs of the common people were filled and a relatively high state of culture developed by individual work on very small tracts; in fact, the native under best conditions can rarely make use of a larger area."—Newell.

If there is any relationship between food and physique, kalo is to be highly commended, for the ancient Hawaiian, according to unanimous report, had a superb physical development. This

* In recent years much of this grazing land has been converted into pineapple fields.

statement must, however, be somewhat qualified. Among the Hawaiian women (and to lesser degree among the men), especially after middle age, the *poi* diet has frequently a very marked fattening effect. This tendency towards obeseness is unquestionably due to the excessive starchiness of the diet, as well as to other causes. The finest forms are to be found among the young men and women. This statement also applies to Polynesia in general. Not only has *kalo* gained wide repute because of the healthful and easily-digested food derived from it, but attention has also been attracted to its heavy yields per acre. A few square rods, under proper cultural methods, will continuously produce enough *kalo* to support a large family. It is due to this great productivity that ancient Hawaii, despite its very limited area, was able to support a relatively dense population. *Kalo* is prominent among the plants recently recommended by the United States Department of Agriculture for planting in some of the Southern States.

Mr. T. F. Sedgwick reports that "taro holds about fourth place among the products of Hawaii, at least in area of land devoted to its cultivation, and probably also in total value of crop. The investment in taro growing approximates from \$450,000 to \$500,000. It is practically all consumed in Hawaii, the export of taro flour or "Taroena" amounting to but a very small percentage of the total crop.

"Taro cultivation is profitable, and land suited to its cultivation, provided it has water rights, brings a high annual rental. The average annual rental per acre in the vicinity of Honolulu for "taro land" ranges from \$30 to \$50. The average retail price of *poi* in Honolulu ranges from 2½ to 5 cents per pound. One acre will generally produce from twelve to fifteen tons, which sells for \$1.75 to \$2.50 per hundred pounds. * * *

"The available irrigated taro land is about all occupied. The opening up of new areas for its cultivation would be dependent, either upon the discovery of sources of additional water supply, or upon more careful use of the water now available.

"Although taro has been the staple food of the Hawaiians * * * the probabilities are that the time will come within the next one or two generations when a large share of the taro lands now in cultivation will be planted to other crops." Considerable areas formerly cultivated in *kalo* are now devoted to rice.

Mr. Barrett, in a U. S. Department of Agriculture bulletin on "Promising Root Crops for the South," writes: "The economic aroids of the world have received very little attention outside of a few tropical countries, yet some of them bid fair to become of great commercial importance within a few years, for the following reasons: They are adapted to soils which are too wet for other root crops, such as sweet potatoes and cassava; they grow rapidly, if given a fairly rich soil and a fair amount of moisture;

they yield heavily, in some cases two to four times the average yield of potatoes; * * * their keeping qualities are in most cases excellent, whether kept in the ground in situ or in a dry place in bags; and they are resistant to insect and fungus pests."

These statements are all applicable to the Hawaiian kalo; indeed, it is probable that no other aroid possesses these valuable agricultural qualities to the degree in which they are manifested in the kalo. As rice among the cereals, as coconut among the palms, so is kalo chief among the aroids.

2. LEAVES.

These, in Hawaiian, are designated *lau-kalo*, *lau-alo*, or *la-alo*. These indicate the linguistic evolution of shortened or condensed forms. The intermediate form, *lau-alo*, has become obsolete, in compliance with the general law that intermediate forms or types, whether in linguistic or organic evolution, tend to become extinct. Compare with these names for the kalo leaf the names *lau-ko* and *la-o*, sugar-cane leaf, and *lau ki* and *la-i*, ki or ti leaf.

The kalo plant is a perennial herb having large, succulent leaves. Some of the ornamental kalos are called "elephant ears," from the fancied resemblance of the huge leaves to the flapping ears of the elephant. The leaves are borne aloft on tall, stocky, flexible petioles, which are of pithy structure, but amply strong to support the generous expanse of leaf surface. The petioles arise at the surface of the ground from the top or summit of the starchy corm. In Hawaiian the petiole is *ha*. This word is also applied to the outside leaves of kalo when they are killed by cold or drought. Each petiole is grooved along its inner surface, and well-rounded on its outer surface, and thus fits snugly around its companions in the bud. This grooving or "u-bar" effect is also a mechanical device whereby greater strength is secured than if the material were disposed in a simple cylindrical manner. The substance of the petiole is relatively weak and pithy, but due to the arrangement of the various tissues, and their normal condition of being swollen with water (turgidity), the petiole is rendered strong for its burden. If the water is drawn out of the tissues of the petiole, as by excessive evaporation, it "wilts," and is not able to sustain the leaf. The Hawaiians call *ae* the liquid or juices that can be wrung from the leaves of such vegetables as kalo.

The leaf-blade itself is shield-shaped or peltate. The juncture of the petiole with the leaf-blade, is called *piko*, in Hawaiian. The blade is disposed at such an angle as to catch an abundance of sunlight. The leaves do not overlap very much, so as to shade each other, but rather fill in all the available spaces, and avoid infringing upon each other's territory. This is especially necessary in the case of large, undivided leaves like the kalo, banana

and *ape*, otherwise some of the leaves would be more or less completely shaded, and to that extent unable to participate in the important work of starch-making, as this process can take place only in the presence of sunlight. In the case of such plants as ferns, the leaves of which are commonly much divided, and which do not need direct sunlight (as is evinced by their habitat in shady woodlands), this shading of the leaves is not so detrimental, and the leaves are therefore frequently crowded into dense rosettes.

The kalo leaves may rise from one to five feet above the ground, varying according to the variety, and to the conditions under which it is growing. Wild kalo, growing in shaded places, commonly has long, spindling petioles, as a result of the leaves' struggle to attain the sunlight. In order to support the broad expanse of leaf-surface the veins are prominently developed. This may be easily seen by examining the under-surface of a leaf. This prominent skeleton of veins in the kalo leaf is in striking contrast to the absence of such a supporting framework in the body of such a plant as the sea-lettuce, which is abundant along many Hawaiian beaches, and resembles wet, green, crumpled tissue paper. The sea-lettuce lives in quiet tidal pools, and so has little need for skeleton or rigid framework.

Just within the edge of the kalo leaf is a continuous vein parallel with the margin and connecting the ends of the lateral veins. This peripheral vein strengthens the margin of the leaf and aids in preventing tearing by the wind or other agencies. Many large entire leaves are protected in this manner. A notable exception is the banana, whose leaves have no such marginal veins, and are therefore usually blown to tatters. The peripheral vein of the kalo leaf opens, by means of large pores, out through the margin. "Frequently in sunshine immediately after rain there is a superfluity of water in the plant, and this is reduced by the discharge of water through these pores—a phenomenon known as 'weeping' which is rather common among the aroids."—Barrett.

The kalo leaves are remarkably smooth textured. The leaves of many plants are characterized by hairy or wooly coverings, but the kalo leaf is entirely devoid of such protection. Immunity is secured by the presence, in all parts of the plant, of acrid substances and gummy secretions. The yellowish juice or latex upon exposure to the air rapidly thickens and turns brownish, forming a viscid gum. The true sap produces an indelible reddish-brown stain.

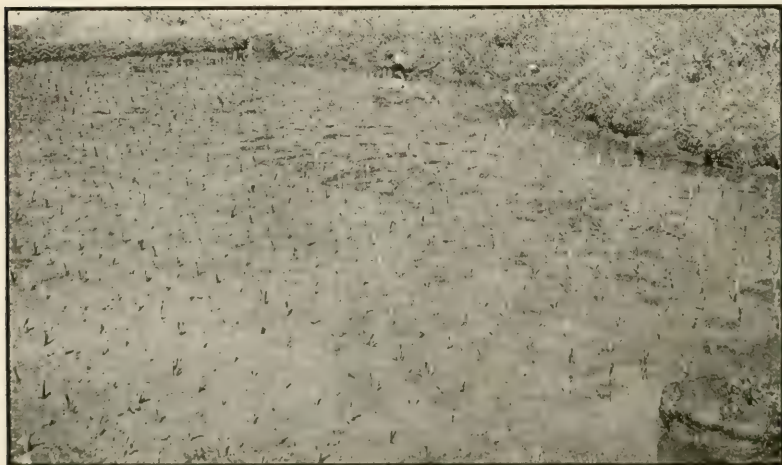
A slight shower fills the concavity of a horizontal kalo leaf with a tiny pool that glistens like quicksilver. Wild kalo frequently grows near the springy places where the woodland wayfarer pauses for a drink. Its freshly-plucked leaf, folded across the base, is a most convenient and artistic cup.

The young leaves are formed in the center of the plant, being furled each within the petiole of the next older leaf. One by one

these delicate younglings protrude from the base of the innermost leaf. Day by day they unfurl till fully spread out in the sunshine to do their work for food manufacture. All parts of the plant are useful—the young leaves (called *haha* or *liko*) and flowers are cooked and eaten as *lu'au* or greens.

Lu'au is made from the delicate inner leaves of the *kalo* top. The outside leaves were only used as wrappers around the bundle of *kalo* when cooked in a native oven. As the young leaves are picked in an unfurled state, those who wish to sell a poorer quality of older leaves for greens are in the habit of carefully furling or rolling them so as to imitate the genuine article. Since *lu'au* was an essential part of every native feast, the term *lu'au* has come to be a designation for the feast itself.

The older, outer leaves are designated *la-cle*. This is a shortened form of *lau-cle*, which is the obsolete original form, and means literally a dark or brown leaf. These tough, weather-worn outer leaves are not suitable for use as food, as was indicated above. They are used as food for swine; may be put onto the *kalo* field for fertilizer; or may be used as wrappers around the bundle of *kalo* when cooked in the native oven. When used as fertilizer on the *kalo* patch they are called *kipulu*.



A KALO LO'I NEWLY PLANTED.

Note the *huli makua*; the saturated soil; the embankments overgrown with coarse grasses and wild *Canna*. The irrigation water entrance shows above center of picture, and exit near lower right-hand corner.



YOUNG KALO.

Each plant has put forth two or three leaves. Note the irrigation water in lower right-hand corner; the adjoining patches; the embankments; the manner in which the soil has been broken up. The banks are covered with *honohono* (*Oplismenus compositus*.)

INSECT CONTROL.

The following extracts are from notes by C. R. Jones, entomologist, in the *Philippine Agricultural Review*:

The losses caused by insects to various crops, garden truck, and shade trees is far in excess of that supposed by the general observer. This loss is steadily on the increase instead of on the decrease, due to the fact that agricultural areas are becoming larger, thus destroying natural food plants of insects and introducing a new environment. Insects that were formerly unknown as a pest may become noxious on closely allied cultivated plants due to the change in environment and the destruction of the normal host plant; thus we see that the injuries caused by insects and the loss in money value are gradually increasing.

There are several factors which come under the head of natural agencies regarding the control of insects; these may be classed as climatic conditions, and predatory and parasitic enemies. In the control of an insect pest, we should, in addition to these combined natural agencies, apply our artificial means in an energetic, syste-

matical, and coöperative campaign so far as possible. The combined efforts on the part of the planters in a given locality are absolutely necessary, as the efforts of a single person combating or entirely eradicating an insect pest in a single field are of no avail when possibly his next neighbor's field is an ideal breeding place sufficient to supply the entire community.

In order to ascertain when and by what means active measures should be taken in regard to any pest, it is first necessary to study the habits and life history of the insects in question and it is here that the planters can aid greatly by reporting injurious insects and submitting to this Bureau specimens of the plants attacked, together with live and alcoholic insect material.

Numerous requests are made on this Bureau for remedies for various insects, but in most cases they simply state that "an insect is injuring the crops" and ask for the best method of treatment. To requests of this kind it is impossible to give any definite answer without knowing the kind of insect or its method of attack.

Sometimes we receive notice that insects are destroying coconuts, palay, shade trees, or other plants, and we are requested to make an investigation. It is not infrequent that we find, upon investigation, merely the results of the insects, or that the latter are in the last stage of development and that the damage by the prevailing generation is already done. In such cases treatment is of no avail. The danger is over and the plants are safe until the appearance of the succeeding generation. If these insects had been reported in due time, their ravages could have been checked, or a study of the life history and habits could have been made and a remedy given for future outbreaks.

In order for us to give remedies and answer questions intelligently, persons requesting information relative to destructive insects should observe the following points:

1. Insect ravages should be reported at first appearances and not when damage is done.
2. Always submit specimens of the insects in question and of the infested plants.
3. Give the general character of the injury and extent of damage.
4. State the part of the plant attacked.
5. In submitting specimens put them in alcohol or "vino" and give all possible information concerning the insect and its habits.

NATURAL INSECT CONTROL.

Many factors, such as birds, climatic conditions, predatory and parasitic insects, may be placed under the heading of natural insect control. Of these, parasites may be put at the head of the list, as they attack various insects in the egg, larval, pupal, and adult stages. Hymenopterous parasites are probably in excess of all other orders of insects.

A noteworthy incident of natural insect control occurred recently when the eggs of a Pierid were parasitized by a small Hymenopter to such an extent that the ravages of the last generation of this insect were rendered negligible.

The eggs of this Pieridae are deposited singly on the under side of the leaves of *Cassia siamea* Lam. Upon hatching, the larvae have heretofore, during the course of their development, completely defoliated the trees which they had attacked.

During November of last year eggs were noticed to have been deposited liberally on the leaves of these trees; some were taken to be bred in the laboratory, and preparations were made to spray the trees when the eggs should have hatched. The collected eggs hatched, but those on the trees did not. Upon examination the latter were all found to be parasitized.

PLANTS RESISTANT TO INSECT ATTACK.

Plants often resist insect attack by "abnormal" growth and by exuding a sticky sap or other similar substance. A noteworthy instance of a plant resisting the attack of insects occurs in the seed heads of lettuce (*Lactuca sativa* L.). Upon the slightest touch to lettuce seed heads this plant exudes a milky, sticky substance, and when the insects alight upon it they are immediately fastened to the plant, and in their efforts to get away the plant is disturbed still more, causing it to throw out still greater quantities of this protective latex, till at last the insects are held rigid and thus soon die. Lately, at Singalong, it was noted that the lettuce seed buds were covered with dead insects, including the following:

Pentatomidae: *Nazara viridula* Fabr.; *Eurydema pulchrum* Westw.

Phrrhocoridae: *Dysdercus singulatus* L.; *Dysdercus poedilus* H. S.

Capsidae: One species; Hymenopterous parasites, four species; Diptera and Microdiptera, five species.

Chrysomelidae: *Aulacophora coffeae* Hornst; one other species.

Lygaeidae: One species.

Reduviidae: One species.

CINCHONA.

Ever since the efficacy of quinine against malarial fevers was discovered and the drug introduced into Europe in 1639, there has been great interest in the plants from which this valuable drug is obtained, especially among those European nations possessing colonies in the tropics, and subsequent to the introduction of the cinchona plant into India in 1861 its cultivation has spread over considerable areas in that country; it is also extensively cultivated in Java.

The cinchona is indigenous to tropical South America, occurring between the tenth and the twentieth degree of latitude and is found at its best at an altitude of from 450 to 1800 meters. The number of species that yield quinine is considerable, but there are only a few that are sufficiently rich in the drug to warrant their exploitation for this purpose. *Cinchona calisaya* Weddell, of which there are several varieties, is richest of all in quinine (containing 5 to 6 per cent.) and therefore this species is the one most extensively cultivated. One of its best-known forms is *C. ledgericena*. *C. calisaya* is a tree very variable in size that thrives best at an elevation of 450 to 900 meters. *C. succirubra* Pavon attains a height of 15 meters or more, and succeeds up to an altitude of 1800 meters, preferring a cool climate. *C. officinalis* Hooker is a straggling tree some 6 meters in height; like the preceding species it does best in the higher elevations. The cinchonas succeed best on hillslopes where the soil is rich and well drained and where the rainfall is fairly abundant, though in this latter respect they are not so exacting as was formerly thought. The plants are easily propagated from seeds or cuttings.

It is quite probable that the cinchonas will thrive in many parts of the Philippines having the right qualifications and the Bureau of Agriculture has recently introduced *C. calisaya* with this object in view. — P. J. Wester, in *Philippine Agricultural Review*.

COCONUT AND COCOA.

The world is consuming hundreds of tons of coconut "butter" daily. We are also using one way and another very large amounts of cocoa butter, which is translated cacao tallow. This tallow, made as a by-product in chocolate manufacture, is a very highly nutritious food in itself and a sort of flavoring "filler" for many sorts of confectionery, etc. It is also extensively used by the medical profession.

While formerly it was considered of not much value, largely on account of its use being hardly understood, it is now worth more than the product itself, something like 2 pesos a kilo. Unfortunately the British, and to some extent the American, manu-

facturers persist in using this old-fashioned and more or less execrable word "cocoa" instead of cacao. Not only in resemblance of words, then, but actually in commerce, do these two comparatively new vegetable "butters" stand as rivals.—O. W. Barrett, in *Philippine Agricultural Review*.

WATERING OF CUTS IN RUBBER TREES.

A paper has recently been published in the *Agricultural Bulletin of the Federated Malay States* (Vol. I, No. 7) which is important from two points of view. In the first place it contains results that are likely to be of practical value, and in the second place it affords an example of an original investigation that has been undertaken by a planter. The first experiment in the investigation was designed to show whether the commonly practised custom of watering cuts lengthened or shortened the duration of the dripping period. In round numbers it was found that when the cut was watered the tree continued to drip for eighty-one minutes, when the cut was not watered, for 102 minutes; that when the tree was watered it yielded 250 drops, when not watered 510 drops. A second and more extensive experiment led to the astonishing conclusion that one thousand trees would give about $\frac{3}{4}$ lb. less rubber a day if water were poured on the cuts than they would give if the cuts were not watered.

The reason for this appears to be that the addition of water induces coagulation.—*Agricultural News*.

LIME JUICE AND SCURVY.

The most notable example of the effect of certain substances existing in food in only minute traces is afforded by the investigations that have led to the discovery of the cause of beri-beri. Volume IX of the Annual Reports of the Chemical Society (1912) contains a review of this work, where the well-known fact is referred to, that the disease is prevalent among rice-eating communities in which decorticated or polished rice is consumed. Whole rice does not induce the disease. The substance inhibiting beri-beri has been extracted from rice husks by water or alcohol, and an alkaloid has been isolated to which the name of oryzanin is given. Small quantities of this substance keep animals free from the disease.

More recently, in the *Journal of the Chemical Society* for March, 1913, an investigation along similar lines is referred to, which has brought to light the fact that lime juice contains an anti-neuritic substance which is probably a specific cure for scurvy.

The investigation was hampered by the guinea pigs experimented on refusing to take oats—a diet which leads to scurvy in these animals. Several new nitrogenous compounds were isolated from the lime juice, however, and a continuation of the investigation will in all probability lead to the recognition of lime juice as a valuable source of anti-scorbutic substances.—*Agricultural News*.

COTTON PICKER.

A description is given in the *Experiment Station Record*, for December, 1912, of a new cotton picker, the mechanism of which consists of a 16-inch cylinder, 12 inches long, on which are mounted twenty spindle shaft frames each carrying seven spindles, making 140 picking fingers in all. As the cylinder revolves, the spindles are caused to revolve at high speed as they stand in a vertical position, and the cotton wraps around them. When they come to a horizontal position they are thrown out of gear and the cotton is stripped off and passed to a basket in the rear. It is claimed that this picker will do the work of from ten to twelve men, requiring only a team and driver.

FATE OF TUBERCLE BACILLI OUTSIDE THE ANIMAL BODY.

A very extensive investigation of the mode of dissemination and outside behavior of the organism causing tuberculosis in animals comprises Bulletin No. 161 of the University of Illinois Agricultural Experiment Station. The author of the paper is Dr. C. F. Briscoe.

In the summary of the bulletin it is stated first, that there are four recognized types of tubercle bacilli; human, bovine, avian, and a type that infects cold-blooded animals. The tubercle bacillus does not form spores, nor does it secrete a soluble toxin, though the fact that poisons are produced is well recognized, since tubercles can be brought on in animals by the injection of dead cultures.

The author next proceeds to emphasize the importance of definite knowledge as to the powers of vitality of the organism outside the animal body, namely, its capacity for resisting conditions of environment inimical to its existence.

The tubercle bacillus, although it does not form spores, is one of the most resistant species of bacteria; it can, however, be killed in a few minutes to a few hours when exposed to direct sunlight. The time of killing is less at higher altitudes, but it is ten to fifteen times longer in diffused light.

Tuberculosis sputum reduced to dust and inhaled by animals causes tuberculosis, and a much less amount is necessary to produce the disease by inhalation than by ingestion, though infection by ingestion is believed to be more common than is generally supposed.

It is next pointed out that a decrease in the number of cases of tuberculosis can, in many places, be correlated with an improvement of the water supply. It is reported that tubercle bacilli live for several months to more than a year in water and other material.

As regards the exact time that tubercle bacilli live under certain conditions of environment, it was found that whereas pure cultures of non-spore-bearing organisms and the vegetative cells of spore-bearing germs exposed to direct sunlight in thin smears were killed in half to six minutes, the human, bovine and avian types of tubercle bacilli exposed in the same way were killed in one to four minutes.

The former group of organisms exposed to desiccation in the dark died in one to four days, spores of *B. subtilis* took thirty-five days; the tubercle bacilli, four to eight days.

Pure cultures of bovine tubercle bacillus mixed in cow manure and exposed in a 2-inch layer in a pasture field in the sunshine remained alive and virulent for two months. Guinea pigs inoculated with germs exposed in manure in the shade developed the disease with greater severity than those animals which were inoculated with germs not protected from the sun.

Tubercle bacilli in the manure of a naturally infected cow, exposed in the same manner as the artificially infected manure, were dead within two weeks after exposure, whilst those bacteria in garden soil and in a dead tuberculosis guinea pig buried in garden soil were alive on the 213th and 71st days, respectively, and dead on the 230th and 99th days, after first exposed.

Tubercle bacilli live for more than a year in running water. A watering trough harboring these germs may therefore be a dangerous source of infection to cattle.

Another possible source of infection is the bones of tuberculous animals which have been ground and utilized for manurial purposes. The danger from this source would, however, be obviated if the bones were steamed as is frequently done.—*Agricultural News*.

LEGUME INOCULATION.

MARTIN J. PRUCHA.

(Circular No. 15, Department of Plant Physiology, Cornell University Agricultural Experiment Station.)

During the past ten years much interest has been created in the use of atmospheric nitrogen by bacteria associated with the legume crops. The Department of Plant Physiology at Cornell University has received, within recent years, a considerable number of inquiries with respect to the subject. These inquiries have been particularly concerned with the introduction of the root-nodule-forming bacteria into fields. Questions respecting the "how" and the "when" to inoculate have been numerous. Many of the letters reveal the fact that the writers possess vague or erroneous ideas concerning inoculation. During the past few years the department has been investigating the subject. In order to set forth briefly and simply the essential facts, as well as to call attention to the pure cultures that the department is now distributing, this circular is presented to the public.



FIG. 30.—Root of soy bean, showing nodules. Natural size.

DIFFERENCES BETWEEN LEGUMES AND OTHER PLANTS.

Leguminous crops are very rich in protein. Alfalfa hay, for example, is almost as rich in nitrogen as is wheat bran. In fact, all the leguminous crops, whether in the form of hay or of seed, differ from other crops in that they are richer in nitrogen content. They are, therefore, very valuable crops.

There is another point of difference between legumes and other plants. If a leguminous plant is carefully dug up and the roots are washed, a number of wart-like swellings may be seen on the roots. These swellings are commonly called nodules. Photo-

graphs of the roots of soy bean, alfalfa, and Canada field pea are shown in Figs. 30, 31, and 32. The nodules on the roots are of the natural size. It is seen that the size and the shape of the nodules vary with the different legumes. Under certain conditions very large nodules may develop. In Fig. 33 are shown roots of the Canada field pea grown in a loamy soil, the nodules being of the natural size.



Another point of interest, especially to farmers, is the fact that leguminous crops seem in some way to add a little fertility to the soil on which they are grown. For many centuries past, farmers have observed that non-leguminous crops, as wheat, corn, potatoes, and the like, grown on land on which clover or some other legume was raised the year before, invariably gave a better yield. It was not understood at first, but scientific study in recent years has shown that legumes may add a certain amount of nitrogen to the soil.

There are, then, three features that distinguish leguminous crops from other crops:

1. Legume crops are very rich in nitrogen.
2. Legumes have nodules on the roots.
3. Legumes add fertility to the soil.

NODULES CAUSED BY BACTERIA.

Fig. 31.—Root of alfalfa, showing nodules. Natural size. If an extremely thin slice is cut from one of the nodules and is magnified under the microscope about one thousand times, a large number of little rod-like bodies can be seen. Some of them are sausage-like in shape, and others may send out short outgrowths so that they are often called X and Y forms. These bodies are bacteria. In Fig. 34 are shown a few of the forms of the bacteria found in the legume nodule. They are living plants and, like other living organisms, they can

grow and multiply. They are so small that they are not visible to the naked eye; fifteen thousand of them attached end to end would not extend more than one inch. These bacteria may live in the soil, and when they come in contact with a legume root they make their way into it and there begin to multiply. In a few days the root develops a swelling, which is a nodule, near the point where the bacteria entered. In the mature nodule are millions of these bacteria.

LEGUMINOUS PLANTS WITH NODULES ENABLED TO USE FREE
NITROGEN FROM THE AIR.

Chemists state that four-fifths of the air is nitrogen—an unlimited supply—but the plants that are raised on our farms cannot use this nitrogen because it is a gas and is not available to them. It has been observed, however, that when nodules develop on the roots of a leguminous plant, that plant is supplied with nitrogen which comes from the air. The bacteria that produce the nodules seem to have the peculiar ability to use nitrogen from the air and in some way to supply the leguminous plant with it. It is not known how the bacteria in the nodules of the leguminous plant get nitrogen from the air, but it is known that a leguminous plant with plenty of nodules on the roots accumulates a relatively large amount of nitrogen inside its tissues, and that a certain part of this nitrogen comes from the air.

*Amount of nitrogen taken from
the air by a leguminous crop.*

Since it is well known that legumes use nitrogen from the air, farmers are naturally interested to know the amount of nitrogen that may be taken from the air by a leguminous crop. This is very difficult to decide. Many experiments have been made in order to determine this, but such experiments have been performed under special conditions. The results obtained, therefore, must not be



FIG. 32.—Root of Canada field pea, showing nodules. Natural size.

applied too closely to field conditions. One of such experiments is reported in Bulletin 147 of the Rhode Island Agricultural Experiment Station. Several different legumes were grown in special flowerpots and the amount of nitrogen was determined both in the plants and in the soil. The authors of the bulletin found that all the different legumes that they grew were able to obtain some nitrogen from the air. From their experiments they found that an acre of soy beans may take about 1000 pounds of nitrogen from the air during a period of five years, or 200 pounds per year. Seven-tenths (140 pounds) of the 200 pounds were removed in the crop, and three-tenths (60 pounds) remained in the soil. Since one pound of nitrogen costs about 16 cents, 200 pounds would cost \$32.

We must be cautious and not jump at the conclusion that every acre of soy beans or any other legume crop, grown in any soil and under all kinds of conditions, would take out of the air an amount of nitrogen worth \$32. In some cases it may be done, but in most cases such an amount of nitrogen is probably not removed from the air by an acre of legumes. One thing is established, however, and that is that the legumes with nodules on the roots are enabled to use a certain amount of the atmospheric nitrogen and that the legumes without nodules are not able to do so.

INOCULATION.

We have learned from observations that nodules may not develop on all the different legumes in all soils. From this we conclude that the bacteria which produce nodules are not always present in every field. We find that legumes such as clovers, which have been raised on almost every farm in this State for many years, generally produce plenty of nodules in most soils. Legumes such as alfalfa, soy beans, and cowpeas, however, which are relatively new crops in this State, do not generally produce nodules. Since it is the bacteria that cause the nodules, and since legumes without nodules are not able to get any nitrogen from the air, it is to our advantage to introduce these nodule-forming bacteria into our fields. Inoculation, therefore, is the introduction into the fields of the bacteria that cause nodules on leguminous crops.

CROSS-INOCULATION.

Can one legume be inoculated with the bacteria from a different legume? This question is often asked by farmers.

It seems to be well established that alfalfa can be inoculated with the bacteria from sweet clover. Successful cross-inoculation is obtained also between red clover, white clover, and alsike clover. In general it may be stated that cross-inoculation takes

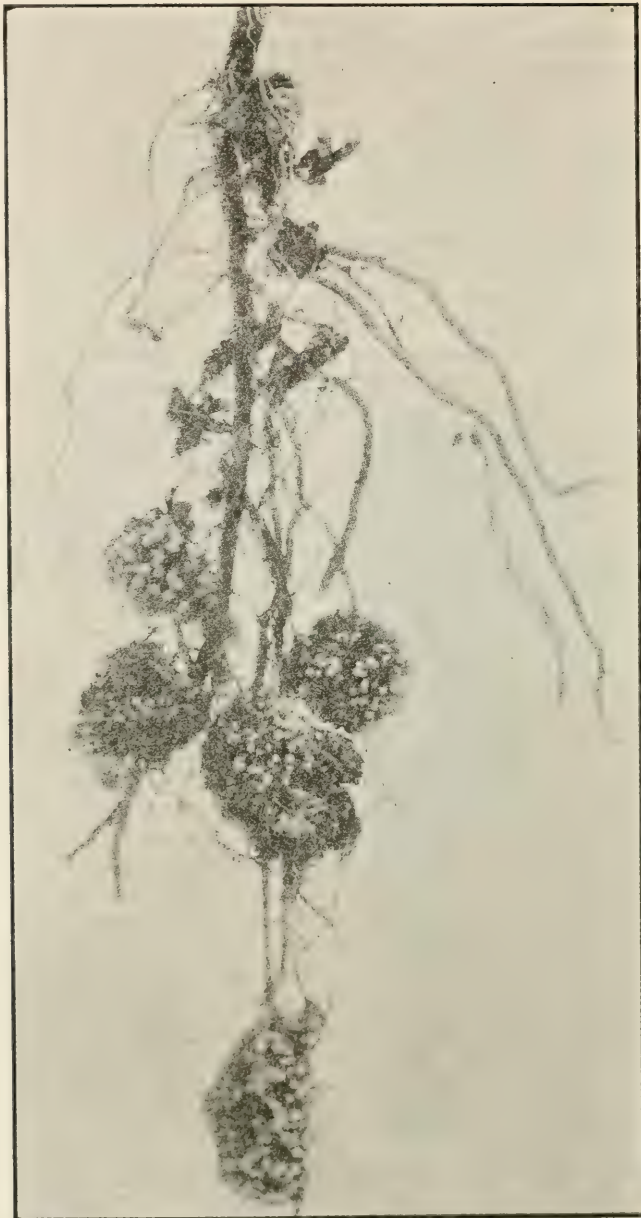


FIG. 33.—Root of *Canada field pea*, showing very large nodules.
Natural size.

place between closely related legumes. Cross-inoculation is not successful between alfalfa, clover, Canada field pea, soy bean, and cowpea. But even when cross-inoculation is successful, there is no evidence to show that it is as efficient as when the legume is inoculated with its own bacteria. The information on the subject of cross-inoculation is meager and the practice is not recommended.

HOW TO INOCULATE.

There are two ways in which inoculation may be accomplished, the soil method and the pure-culture method.

Soil Method.

When we find nodules on a leguminous crop, we know that in the soil where the crop is being grown there are nodule-forming bacteria. If we take a certain amount of this soil and scatter it over a new field we introduce into the new field, along with the soil, some of the bacteria. In practice, usually about two hundred pounds of soil broadcasted on every acre will be sufficient to inoculate the field. This is a simple method of inoculation and good results are invariably obtained. There are, however, some drawbacks to it. It is not always easy to get the soil, and because of its bulk it is difficult of transportation. A more serious objection to the soil method of inoculation is that when the soil comes from an unknown field various weed seeds, diseases, and insects may be in it. In that case such pests would be introduced into our field and would cause trouble. Dodder, for example, may be spread in this way. Therefore one should bear this in mind when considering the use of soil for inoculation. The method is especially well adapted for inoculating one field with soil obtained from another part on the same farm.

The writer believes that the simplest and most economical way to inoculate is, not to plant and inoculate a large acreage at first, but to plant one acre or less of the particular legume and inoculate a part of it, leaving the other part uninoculated. If the plants on the inoculated part of the field look greener and healthier than those on the uninoculated part, and in addition have an abundance of nodules on the roots while the plants on the uninoculated part have no nodules or very few, the field needs inoculation. This practice has two advantages: in the first place, the farmer learns whether the soil needs inoculation for the particular legume; and in the second place, in case inoculation is needed, the soil from the inoculated part of the field



FIG. 34.—*Legume bacteria, highly magnified.*

is as good inoculating material as any other. The whole farm can then be inoculated with very little cost to the farmer.

Pure-culture Method.

In order to make the inoculation more simple and to meet the various objections against the soil method, investigators have devised the pure-culture method. The nodule-forming bacteria are carefully removed from the nodules and are made pure. In making the nodule bacteria pure we separate them from all kinds of molds and other undesirable bacteria. When they are purified they are planted on some sterilized food in which they can multiply. In such food an extremely large number of the bacteria may develop in a few days. When the nodule bacteria are propagated in this manner the preparation is called a pure culture.

In some cultures the bacteria are propagated in liquid, in others on vegetable gelatin, and in still others unknown mixtures are employed. After considerable investigation this department decided to employ sterilized soil as a medium in which to grow the bacteria in pure culture.

In using pure cultures for inoculation, the object to be attained is to distribute the bacteria evenly over the entire field. Two methods may be employed in order to accomplish this: (1) The pure cultures may be mixed with a certain quantity of water and then poured on the seed. The seed is stirred until each one is moistened and is then ready for planting. It is assumed that some bacteria will adhere to every seed and will be carried with it into the soil. (2) When it is not convenient to treat the seed as above described, the pure cultures may be mixed thoroughly with loamy soil, allowing about two hundred pounds of soil for each acre. The soil is then broadcasted over the field and harrowed in.

The pure-culture method of inoculation has some advantages. Being pure, there are no weed seeds, no insects, no diseases nor undesirable bacteria, provided the culture is prepared properly. It is easily obtained, easily handled, and should be cheap.

In general, a new discovery of this kind does not at first always give good results. This was true in the case of pure cultures. The reason for these failures is very simple. At first not enough was known about the nature and the habits of these nodule-forming bacteria, and consequently they were not treated properly. The result was that often, by the time the farmer procured the culture, the bacteria in it were all dead or some wrong kind of bacteria had entered into it. Investigators have learned, however, by the failures. The writer believes that at present enough is known about these bacteria to enable workers to prepare pure cultures that will give good results.

WHEN INOCULATION IS NEEDED.

To inoculate each leguminous crop every time it is planted requires both labor and money, and it is a waste if inoculation is not needed. On the other hand, if the crop is not inoculated, and inoculation is needed, the farmer loses money. So it becomes of some importance to know what leguminous crops should be inoculated.

There is only one known way by which the farmer can learn with certainty whether inoculation is needed, and that is to grow the crop in the field. If the root-nodules do not develop at all, or develop on only a few isolated plants, that leguminous crop needs inoculation when planted in that field. If, however, some nodules are present on almost every plant, inoculation is probably not needed. The simple experiment described on page 29 can be carried out by any farmer. By performing such an experiment he can readily ascertain which of the leguminous crops need inoculation when planted on his farm. To perform such an experiment, however, takes time, and many farmers may prefer to inoculate each leguminous crop rather than to take time for experimenting. Although there is no other known way of finding out with certainty as to the need for inoculation, there is a certain amount of information that is helpful in deciding the question.

Leguminous crops such as clover, peas, beans, and others that have been grown on farms in this State for many years, probably need no inoculation. There are some persons, however, who assert that it pays to inoculate every leguminous crop every time it is planted. It may be true that such a common crop as red clover may be improved by inoculation, even in New York State where it has been grown extensively for many years. It has never been proved conclusively one way or the other; but the writer's opinion, based on casual observation, is that soils on most farms in New York State are naturally well inoculated with the bacteria that produce nodules on legumes that have been repeatedly raised on the farms. On the other hand, alfalfa, soy beans, cowpeas, and any other leguminous crop that has never been raised on the farm, as a rule need to be inoculated when planted for the first time.

That inoculation is needed in most cases when alfalfa is grown for the first time has been shown in Bulletin 313 of the New York (Geneva) Agricultural Experiment Station. In one hundred and three experimental fields of alfalfa, distributed in thirty-nine counties of this State, only twenty-five were successful without inoculation. The authors say that in beginning to grow alfalfa proper inoculation of the soil is a point that is worthy of the careful attention of any farmer in this State.

WHY INOCULATION IS NOT ALWAYS SUCCESSFUL.

It occasionally happens that inoculation does not produce good results. There are various reasons for this, but usually it is due to the poor quality of the culture or to the condition of the soil. The culture must not always be blamed. We all know that some crops grow well on our farms, while others may grow poorly or not at all. Bacteria are living plants, and in order to enter the roots and produce nodules they must live and multiply in the soil. There are some soils in which the bacteria will not live and no amount of inoculation will produce good results. Or it may be that the particular legume does not grow well in the soil. In either case good results from inoculation cannot be expected. The fault of the soil must first be corrected. It has been found that an application of lime—about a ton per acre—invariably benefits certain of the legumionous crops, alfalfa in particular. In Bulletin 313 of the New York (Geneva) Agricultural Experiment Station there are given some interesting results on the benefit of lime for alfalfa. Sixty-four alfalfa fields, well distributed over the State, showed that only eleven were successful without lime, and all the fields except six were improved by the addition of lime.

STERILIZED SOIL CULTURES.

As previously indicated, this department has developed a method for distributing nodule-forming bacteria in pure culture. It has found that in sterilized which, which it uses, these bacteria multiply readily, as many as three billion being present in an ounce of the soil. During the past two years a limited number of these cultures have been distributed, principally for experimental purposes. Because of the favorable results obtained the department proposes to distribute the cultures for general use among the farmers of the State.

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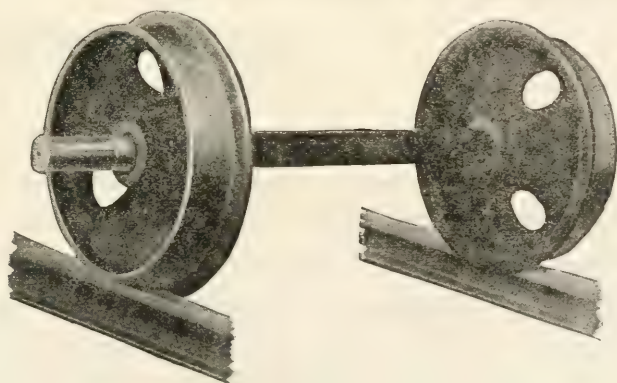
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 Second Report of the Board of Commissioners of Agriculture and Forestry, for the
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 Report of the Board of Commissioners of Agriculture and Forestry, for the biennial
 period ending December 31, 1910; 240 pp.; 45 plates.
 "Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
 "Digest of the Statutes Relating to Importation. Soils. Plants. Fruits. Vegetables
 etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- "Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

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- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
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- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
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THE HAWAIIAN FORESTER AGRICULTURIST

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No. 8.

AMERICAN FORESTERS HELP PALESTINE.

An agricultural colony in Palestine has just applied to the U. S. forest service for help in planting trees to bind the drifting sands of the Mediterranean. The colony is near Jaffa, or Yafa, the ancient Joppa of the Bible, and there is being developed in connection with it a seaside resort, with hotel, villas, bath houses, and gardens.

The experts of the service point out that the reclamation of sand dunes is not a serious problem in the eastern United States because the prevailing winds are from the land and the sand is blown into the sea. On the west coast the situation is more serious. The most notable example of reclaimed sand areas there is furnished by Golden Gate Park, San Francisco, where grasses, acacias, and, later, trees and shrubs have converted sand wastes into pleasure grounds of great beauty.

The attention of the Palestine colony is called to the wonderful reclamation of the Landes, France, where a wealth-producing forest of maritime pine, the source of the French turpentine, has been grown to take the place of shifting dunes. The American foresters also give the address of the French seedsman who furnished this government with the maritime pine seed which has been used in planting experiments on the Florida national forest, near the Gulf coast.

Hampton Institute's work for negroes will probably afford some ideas of value for consideration by the promoters of vocational instruction in Hawaii.

Anything Hawaii takes up in the way of new agricultural industries is sure to be noticed abroad. Progressive methods appear to be taken for granted as appurtenant to these islands. The best way to live up to this reputation is perseverance in combating obstacles of pests and of other things, and by looking out for all good ideas put in practice in other countries of similar conditions. Many things have been fitfully taken up in Hawaii and abandoned almost at the first blush of misfortune in results.

There is nothing much more in demand today than new material for paper-making. No doubt there are many plants of tropical and sub-tropical feasibility of cultivation which might be utilized for the purpose in question. Several have been mentioned in articles appearing from time to time in the Forester. One is noticed in this number. An article descriptive of another is reserved for a later opportunity. With the fuel problem once an obstacle to manufacturing in Hawaii to some extent solved by cheap electric power and mineral oil, the conversion of raw material into pulp or even finished paper here should not be regarded as a wild proposition. What is most immediately important in the matter is finding suitable raw materials. Hawaii itself is a consumer of considerable quantities of many kinds of paper, while the waste of different of its agricultural products is undoubtedly suitable for paper-making stock.

From the goodly amount of notice Hawaii received in the metropolitan press on the occasion of its slender exhibit at the international rubber exhibition in New York last year, it may fairly be premised that with a worthy exhibit of all of its commercial products in London next summer, on the occasion of both the rubber and the tropical products exhibitions to be held there conjointly, everything that these islands are now producing would be introduced to the markets of the world very effectively. No amount of literary advertising will rival such an opportunity of showing the wares themselves to people ready to buy on evidence of merit. In addition to the presentation of our products to the attention of European purchasers, the exhibitions in question will afford one of the grandest opportunities possible for setting forth the attractions of Hawaii to tourists and investors both. All that is needed is taking proper advantage of the big chance.

An article in this number, reproducing the suggestions of the University of Nebraska experiment station on the care of milk and cream in the home, should be as valuable in Hawaii as in the northern locality for which it was prepared.

Homesteaders in this Territory will find some edifying material in an article from Australia reprinted elsewhere on the advantages of good cultivation.

A request for the Forester regularly has been received from a South African institution, together with a list of names for mailing sample copies to leading agriculturists in that country. The request will be cheerfully complied with.

This number contains No. 2 of Messrs. MacCaughey and Emerson's paper on the kalo (taro) in Hawaii.

Reports of the various divisions of the Board of Agriculture and Forestry for July have not been received in time for publication in this number.

Cotton growing has been abandoned by the Kunia Development Company on this island, owing to the ravages of the boll-worm, and the company has given a lease for nine years and nine months of fifty acres of its land to two Japanese, who, it is understood, are raising pineapples on the holding.

At last accounts the fungus blight on pineapples on the island of Kauai had become very bad again, after it had appeared to have been overcome, the young plants now being infected. Thus far the blight has not appeared on any other island, and Kauai is being quarantined against it.

CONTACT BETWEEN PLANTER AND SPECIALIST.

(Agricultural News, West Indies.)

Nobody at the present day can fail to appreciate the enormous gulf that divides the practical man or capitalist from the specialist in science. The separation of the two positions is very patent in modern agriculture, and can be vividly realized by contrasting the mental outlook of, say, the manager of a large sugar estate, and that of the entomologist whose faculties are concentrated on the wing markings of half a dozen species of insects. It is obvious that a proper relationship, or rather a proper communication or contact between the two is of the very greatest importance, and it is the object of this article to delineate the position of the specialist, and to point out the methods that are, or should be adopted, in order that his activities may be utilized to the best advantage.

In most of the progressive agricultural communities in the tropics will be found to exist departments (boards, or else entirely non-official agricultural organizations, which employ the services of scientific specialists—agricultural chemists, mycologists, entomologists and the like. Strictly speaking—the matter will be enlarged upon later—these so-called specialists are not pure specialists, for in many cases they possess a good general knowledge of agriculture; yet in spite of this, their work is sufficiently restricted to narrow lines of investigation to render their mentalities quite different to those of practical planters. In order to contrast clearly the two types, it will be convenient to adopt a figurative illustration. The ability of the specialist may be con-

sidered as being represented by a long, narrow, vertical rectangle—his knowledge is deep rather than broad. That of the practical agriculturist can be symbolized in the shape of a square—his knowledge is of a normal nature and quite unspecialized. Clearly these two figures may be equal in area, thereby indicating a common value as regards potential ability, but the essential feature of the conception is that the two figures are so dissimilar in shape that they cannot be made to fit when placed side by side. Occasionally, as already hinted, where the specialist has received a general training, and also in a case where the practical agriculturist has received a special training, the resulting figures have more in common, and may fit fairly well. This ideal condition is seldom found, however, and at present it is generally necessary in tropical communities to have an organization at the back of the specialists, of which the main function is to connect up the two dissimilar types just described.

It is evident that the knowledge of the specialist is a source which must be tapped. In spite of departments and other organizations, there is a strong tendency in the tropics, today, for men who were originally specialists to have so acquainted themselves with the point of view and the requirements of the practical planter that they have become practitioners in the branch of science in which they are interested, and this is frequently followed by their becoming established in purely administrative positions where they direct the work, and disseminate the results of younger specialists who follow in their wake. The necessity for feeders of knowledge is greater than the necessity for producers of knowledge. This peculiar and most important trend is not altogether desirable, for it leads to the loss of research men just as they are in possession of valuable experience and in a position to tackle local problems deftly and with assurance. In fact, today we find the pure specialist more or less confined to the great centres of learning in temperate countries. There is need for more of these men in the tropics; but, until tropical public opinion better appreciates the value of abstract research by learning how to tap it, there is little prospect of such a change being brought about. In medicine, to strike a parallel contrast, the value of the specialist is clearly understood. The significance of a serious affection of the eye or of the throat for instance, is at once appreciated, and information is obtained by intelligent people at the right time and from the right authority. On the other hand, of course, an occasional ailment of these organs may be treated without the aid of skilled assistance. Judgment is exercised. In agriculture, a similar attitude is very uncommon. In agriculture the tendency is in the direction of *laissez faire*: unless the specialist rises from his microscope and searches for something to treat, results will be wasted. His mind, however, by interruption, is taken off his work, and the results have to suffer in any case.

The solution to these difficulties lies mainly in the fact that education and research should go hand in hand under proper conditions. At present there are too many isolated attempts at research in the tropics and not enough in the direction of broad education. The research man should be allowed to teach the young generation he will later advise.

Agricultural education has from time to time been subjected to considerable ridicule by practical agriculturists, even by those who have received one. That is because it has not been correctly administered. Education in agricultural science should have for its main object the teaching of where, when and why to apply for advice, and not aim merely to instil isolated facts and operations or to train specialists. The student who intends to cultivate land should not, for instance, be taught how to analyze a soil, but rather under what conditions a soil should be analyzed and the usefulness of the results.

Consequent on such a widening of the practical man's square—to speak again figuratively—his contact with the specialist will be increased without interfering either with his own particular depth and kind of information or with that of the specialist. It is true that specialization might progress, under such conditions, more rapidly than the practical man could keep up with, in which case the class of scientific practitioner already referred to, would quickly evolve; but it would be from a different cause, a more desirable cause than that which necessitates the combination of agriculturist and scientific specialist in one, at the present day.

With the extended appreciation of scientific results by the agriculturist, the necessity for a large number of agricultural departments would tend to diminish. The State would be relieved of responsibility. Taxation would be less. The planter does himself what he paid others to do. Men of administrative ability would be required in the various communities to direct local coöperative movements it is true, but they would be entirely unofficial. A priori, one other thing would be necessary. Those who intended to undertake the cultivation of the land, who did so with the fixed intention of discreetly utilizing the knowledge of the specialist, would need to be catered for by the establishment of an inexpensive and easily accessible tropical agricultural university.

PROBLEMS IN PROPAGATION BY CUTTINGS.

Professor Bayley Balfour, F. R. S., delivered as the eighth "Masters Lecture," an extremely interesting and practical dissertation on the subject of propagation by cuttings. The lecture is published in the *Journal of the Royal Horticultural Society*, Vol. XXXVIII, Part 3.

Professor Balfour commenced by raising the question as to

the truth of the commonly made statement that many plants cannot be propagated by cuttings. In the course of the lecture it is made evident that in the light of modern investigation this statement is unjustified. Two remarkable cases are cited early by way of illustration: one being the case of a species of *Gypsophila*, which was formerly believed to be unresponsive to vegetative propagation, but which had been shown by the author to be easily reproduced by internodal cuttings. The second case concerned a plant of great importance in the tropics—the bamboo—which until recently had been considered only sexually reproducible. Professor Balfour, however, has shown the bamboo to be readily increased by cuttings.

Proceeding next to general considerations of the most interesting nature concerning plants as individual organisms, it is pointed out that a plant, unlike one of the higher animals is not, strictly speaking, one individual. It is a colonial organization. "A plant is composed of a sheet of protoplasm (living substance) stretched over a skeleton." A limb of a plant can be removed and another will grow to replace it; if the limb of an animal be removed, only mutilation can result. A plant is therefore potentially immortal.

Two common instances of vegetative reproduction in nature were next cited—those of the iris and the strawberry. The former plant creeps along under the soil forming new additions to its body: in fact it is an accident if the plant does not continue to live for ever. In the case of the latter example, the plant extends itself by runners—by the formation of roots near the terminal bud at the end of the prostrate offshoot.

Consideration of these two cases shows that the necessary conditions for reproduction are (a) that the young buds which give rise to the new shoot must receive ample food-supply from the parent plant until it has rooted itself; (b) that there be water to stimulate root development. These two facts are of primary importance.

After referring to the advantages that accrue to gardeners from the presence of the bulbets, corms and the like amongst monocotyledonous plants, the author proceeded to the important subject of callus formation in relation to vegetative propagation. The growth of callus consists in the formation of a mass of living cells under the stimulus of wounding. In an ordinary dicotyledonous stem or root it may take origin in the pith, in the medullary rays, in the cortex, or in the active wood cambium, and it forms lobulated projecting masses at the point where it occurs. Callus more rarely forms in monocotyledonous plants—these are content to heal wounds by a cork covering only; when it does appear, however, it arises from the cortex of the stem. Callus formation is a mark of the colonial organization of the plant already referred to. It is associated with the formation of adventitious roots.

In continuation, the lecturer proceeded to contrast the readiness with which can be propagated cuttings from soft-wooded and hard-wooded plants. The difficulty met with in the case of hard-wooded plants is explained by the fact that the absorption of water is less easily effected than in the case of soft cuttings. For other reasons, which are later referred to, resinous plants, and those rich in latex may also be difficult subjects for propagation by cuttings.

After pointing out the nature of the development of a dicotyledonous cutting, the question as to whether it is advisable to remove the leaves at the base of a cutting is referred to. It is pointed out that the practice of leaving them has these advantages: (a) the cutting is saved the healing of the wound caused by their removal; (b) the lower leaves sunk in the soil may root like the stem and aid, thereby, water absorption; (c) the lower leaves will aid in the manufacture of food for the cuttings. Another point considered was the fact that some plants propagate far more readily if the cutting be made through an internode than through a node, and vice versa. As an illustration, Clematis cannot be propagated if nodal cuttings are used, whereas internodal cuttings may be "struck" within a fortnight. It is indicated that an investigation of the causes of such differences in cuttings is one of the problems of propagation which yet remains to be solved.

Alluding again to callus formation, the interesting and extremely important feature was noted that, however difficult it may be for a cutting to strike, yet once callus is produced, root development can always be stimulated by paring this callus.

After referring to the importance of the size of cuttings illustrated by the fact that small cuttings of hard wood plants germinate quicker than large ones, the lecturer dwelt upon the significance of resin in relation to propagation. When, for instance, cuttings are taken from coniferous trees, the shoots instead of producing callus, generally excrete resin. This flows out copiously over the surface, covering it effectively with a hard skin, thereby constituting a hindrance to the exit of young rootlets. It is necessary not only to remove this resin but to check its exudation. This can be done by plunging the cut end of the cutting in nearly boiling water. The cut resin canals are thus sealed and doubtless at the same time the heat stimulus promotes formation of callus. Dicotyledonous plants with resinous and milky juice are in like case with coniferous, and require to be treated after the same fashion.

The actual state of a shoot to be used for a cutting was another point taken for consideration. A vigorously growing shoot removed from a plant and at once placed in the nidus for propagation may fail to "strike." Its vigor is probably too great. The

soundness of the practice of allowing some cuttings to dry slightly before planting in soil is clearly supported by this interesting feature of development.—*Agricultural News*.

RECENT WORK ON THE PARASITES BELONGING
TO THE GENUS GLOMERELLA.

Of recent years problems in mycology have been regarded from a much wider point of view than was formerly the case. Particularly is this so in respect to that branch of the subject known as parasitology. As an illustration of this new phase, the work of Shaw in India on *Rhizoctonia* may be cited, and as a still later example, may be mentioned the recent work on the parasites of the genus *Glomerella*, conducted by C. L. Shear and Anna K. Wood of the United States Department of Agriculture. A complete account of this latter investigation has just been published as Bulletin No. 252 of the Bureau of Plant Industry, and from this interesting and important paper most of the information in the following article has been abstracted.

The name *Glomerella* is applied to the ascogenous forms of *Gloeosporium* or *Colletotrichum*—form-genera of the fungi imperfecti, the parasitic nature of which is well known in the West Indies. The objects of the work under review were to study the production of the ascogenous stages, and to determine the habits and identity of the numerous forms of *Gloeosporium* and *Colletotrichum* found upon the same hosts, and upon different hosts. The method of study adopted was to observe the behavior of the different forms in the moist chamber and in pure culture, and to carry out a large number of cross inoculation tests to find out whether a so-called species of *Glomerella* found on one host, say on the cotton plant, could infect another host, say the avocado, on which a supposed different species of *Glomerella* was regarded as being individually parasitic. Apart from its general interest, the economic value of such an investigation is readily apparent.

With particular reference to the life history of *Glomerella* it is important to understand that until recently, the two principal spore forms, conidia and ascospores, have been described and treated as distinct organisms. As is already pointed out, the conidial forms are well known under the name of *Gloeosporium* or *Colletotrichum*. The essential feature of the work under review is that ascospores, conidia and chlamydospores or appressoria (resting-spores) are shown to be normal stages in the life-history of the genus. These facts greatly simplify the generic classification of the forms.

In regard to the thirty-six hosts—of which the names of some are given later—that have hitherto been considered as being

attacked by thirty-six different species of *Glomerella*, it has been found that neither morphological nor physiological differences can be observed which are sufficiently constant to be regarded as specific characters. All the different forms have been referred by the authors to three species of *Glomerella*: *G. cingulata* which occurs on thirty-four of the hosts, *G. gossypii* on one (namely, cotton), and *G. lindemuthianum*, on one.

G. cingulata is exceedingly variable in all its characters. The cause of this variability is not yet clear. The essential point about this fungus is that it can often be found to grow from apparently healthy tissue, which has been washed in corrosive sublimate. The explanation is that the chlamydospores send a germ tube down through the epidermis of the host plant, which lies quiescent until the plant becomes weakened from some physiological cause, when the fungus begins to develop as a vigorous parasite.

It is stated by the authors: "Inoculation experiments with fruits have shown that most of the forms from different hosts will produce the characteristic *Glomerella* rot on fruits of other hosts. It is also shown that there is a great variability in the virility of different races or strains of the fungus from the same host. In one experiment races from the lemon, grape and fig produced more serious cases of bitter-rot of apple than a race of the fungus derived from apples. These facts are of great importance in connection with the selection and production of disease-resistant varieties of plants."

It may be added, further, that this is of immense importance in regard to mycological legislation, in view of the fact that the disease can apparently spread as easily from temperate countries to the tropics, as within the tropics itself. It must also be remembered that *G. cingulata* can also be carried by any one of thirty-four different species of agricultural plants, including such diverse forms as palms, oranges, apples, gooseberries, cacao and arrowroot. Of great economic significance is the fact that one species of *Glomerella* is confined to cotton. This species, it may be added, occurs in the West Indies and causes the well-known disease, anthracnose.

The production or non-production of the perithecial stage of *Glomerella* appears to be a fairly well-marked hereditary race character. There is no evidence to show that the production of perithecia is controlled by any of the ordinary conditions of nutriment or environment, though accurate investigation along this line would possibly lead to results of great importance.

In conclusion, the methods of controlling *Glomerella* may be briefly summarized as follows: (1) spraying with Bordeaux mixture; (2) selection of fungus-free seed—particularly valuable in the case of cotton; (3) eradication and destruction of dead and diseased parts of infected plants.

The selection and breeding of resistant varieties may also be practicable in some cases.—*Agricultural News*.

GOOD ROADS AND THE ELWELL LAW.

By SENATOR JAMES T. ELWELL of Minneapolis.

The Elwell Road Law was enacted for the purpose of building leading roads throughout the State of Minnesota, and to do it in a large and comprehensive manner, so as to connect city with city, and village with village, and to give to the citizens of each county easy access to their market towns.

The general plan embodies the idea of getting into one lump sum for each county of the state, enough money at one time to build the main arteries of travel for each county.

By its provisions any county in the state may build \$200,000 worth of good, permanent road which will not only aid the farmers of such county in getting to their market town, but will also be an example to them of the kind and character of road which can and should be built to connect with these main arteries.

GENERAL PROVISIONS ARE SIMPLE.

The general provisions of the bill are simple, although the machinery is quite lengthy and explicit, as that feature of the bill is provided for by adopting the main features of Chapter 230 of the 1905 Ditch Law. Under the provisions of the Elwell law, the state pays one-half the cost of the road, the county one-quarter, and the benefited property the other quarter, each having ten years in which to make their respective payments. The county is made the financial agent and it issues the bonds or certificates of indebtedness of the county payable in from one to ten years for the entire cost of any and all roads to be built within the county limits, thus providing for the payment of any and all roads to be built under this law.

Each road or system of roads to be built will have the advantage of having the cash on hand to pay for the improvements as they are made.

All roads, after a careful survey and proper advertisement, will be let to the lowest bidder who will give the proper bonds assuring the county and the State Highway Commission that the work will be done satisfactorily, and in accordance with the plans and specifications of the State Highway Commission.

It is expected under this plan of procedure to interest large contractors who have the proper machinery and equipment of every kind for grading and building roads, thereby saving the county under our present plan of building roads from $33\frac{1}{3}$ to 50 per cent. The time has passed when the farmer desires to work on the road, as he can make more money by attending to his farm duties, and the man of large experience with proper machinery can do the work for from one-third to one-half of what it will cost the farmer to do the same work.

Then, too, the large contractor with his heavy machinery traveling over the road while it is being built, will be able to roll down a new road so that when completed, it will be as compact and as good for travel and heavy hauling as an old road. This has already been demonstrated under the provisions of the Elwell law in Winona county where the first contracts were let for practically \$116,000. The contractors have demonstrated that they can haul, with their up-to-date machinery, gravel and road material for from ten cents to thirteen cents per yard per mile, when the hauling from the same pits and under like conditions costs from thirty-five to fifty cents to haul with teams.

The large contractor has the advantage of using his heavy machinery $23\frac{1}{2}$ hours out of 24 each day without crippling the efficiency of his plant; and where all of the material is handled with steam shovels, and wide-tired wagons with self-dumps, it can readily be seen it is easy to do this work for from one-third to one-half the ordinary cost and yet be able to pay his men who do the work large enough wages to satisfy them and to insure their earnest and faithful coöperation in completing the work.

PROCEDURE UNDER THE LAW.

In proceeding under this law; first enlist the coöperation of the County Commission by petition or otherwise and make a preliminary survey which need not be expensive, by a competent engineer and file this preliminary estimate of the cost of the improvement with the County Auditor, and a copy of the same should be filed with the State Highway Commission. The County Commissioners should then approve the road, afterwards, the Highway Commission approving same.

The next step would be for the final survey of the road which could be made by the State Engineer or by a competent engineer whose work would meet with the approval of the Highway Commission.

After a proper hearing before the County Commissioners, and a determination to build the road, viewers are appointed by the County Commissioners to spread the assessment of one-quarter of the cost of the road. These viewers are three in number and must be men who are not in any financial way interested in the construction of said road. The assessment may be spread in the discretion of the viewers any distance which is proper and right and where they think there is benefit.

PLAN FOR NORTHERN MINNESOTA.

In Northern Minnesota, the general plan is to spread the assessment three miles either side of the center of the road, and on a good gravel road, costing \$1,500 per mile, the assessment averages

one cent an acre per year for each of the following ten years with interest on same.

A good gravel road costing \$1,000 per mile with assessment spread two miles either side of the center of the road would be the same amount, or, if spread three miles would be less than three-fourths of a cent per acre.

No farmer that we have ever seen has objected to the amount to be assessed against his land under the provisions of this law when he knew exactly the amount which would be assessed to him for benefits, as in nearly all cases this kind of a road would save him in hauling his produce to the market several times its cost each year, besides the added pleasure of driving over a good road.

EVERYONE INTERESTED IN ROAD.

One of the good features in this road law, is that everyone is interested in its cost and construction. The state, because it pays one-half; the county, because it pays one-quarter; the individual benefited and living near the road, because he contributes his share of the last quarter of the cost of the road.

With everyone interested, with money in hand to pay for all work when it is completed, a good road should be built at the right cost.

WHAT MAY BE DONE UNDER LAW.

Finally to sum up what may be done under this law, the State of Minnesota is at the present time able to build \$21,000,000 worth of good road, or more than \$200,000 worth of good-road in each and every county of the state, and if we put into operation this law to its fullest extent, we double the value of every acre of land in the state, provide ourselves with all the main roads necessary, and make Minnesota a leader in good roads.—*North Woods.*

RUBBER-VINE CULTIVATION IN THE BAHAMAS.

It is mentioned in the *Journal of the Royal Society of Arts* for April, 1913, that an extensive cultivation in the Bahamas of the rubber vine *Cryptostegia grandiflora* is in contemplation. It is understood that approximately 5,000 rubber vines will be planted to the acre. After six months' growth the rubber vine is said to attain a length of 12 to 30 feet. The vines will be cut in about twelve months, when there will be presumably about 2 lbs. of shrub to the plant as a minimum, yielding about 2 per cent. of rubber, or 200 lbs. to the acre. According to the American Consul at Nassau, a large number of shoots to be planted in the Bahamas have been ordered from Mexico, and special machinery for extracting the rubber and fibrous by-products by a secret process has been ordered from the United States.

The rubber juice is contained chiefly in the lactiferous ducts of the bark, but to some extent also in the wood of the stem—in fact, the entire plant contains a certain amount of rubber. While the process of extraction is secret, yet in the main, it appears that it is analogous to the production of sugar from the sugar-cane.

The fibrous by-products of the rubber vine are considered as possessing an importance possibly greater even than that of the rubber itself. The bark of the vine yields 6% of the weight of the whole stem, and is a pure cellulose fibre, having a silky lustre comparable to Japanese ramie fibre and almost equal to cotton. It is thought that it can be used as a substitute for Egyptian cotton, especially in the manufacture of fine underwear and other articles. The pods of the vine besides containing a fair percentage of juice, have large quantities of silky cotton such as would be suitable for stuffing pillows; when refined and specially treated, it can be successfully spun with ordinary cotton. The woody substance of the vine, when bleached and worked out, yields a fibre suitable as paper pulp. The vine can be best harvested after the fruiting period.—*Agricultural News*.

LONDON OFFERS GOOD CHANCES FOR PROMOTION.

(Honolulu Star-Bulletin.)

According to the printed matter issued relating to the Fourth International Rubber and Allied Industries Exhibition, and the First International Cotton, Fibers and Other Tropical Agricultural Products and Allied Industries Exhibition, to be held conjointly in London from June 24 to July 9, 1914, both days included, every opportunity will be given to each country exhibiting to obtain individual publicity in special ways. Thus it is stated:

"Special rooms will be provided for demonstrations, lectures, addresses or other functions, as well as theaters for moving pictures showing the production, packing, shipping and manufacturing of the crude products for commercial use. In all cases the films must be supplied by the exhibiting countries. Particular mention is made of the fact that no charge will be made for these concessions.

"The exhibition permits of the display of every description of commercial products grown in the soil, also of the allied industries, as well as manufactured products, machinery and appliances.

"Many of the British and foreign governments, also associations, companies and firms, have intimated their intention of being represented in the various departments.

"All countries exhibiting, whether through the governments or associations, have the privilege of issuing special invitations to the press, to those interested in their respective countries and to

any others they may desire to invite, when special addresses may be given on the resources and attractions of the country and that particular day will be known by the name of the country. For instance, 'Ceylon Day,' 'British Malaya Day,' 'Brazil Day,' etc."

If Hawaii be represented, there will be "Hawaii Day," of course, when Bonine pictures of Hawaiian industries and scenic attractions should be given. Artist Hitchcock, on being asked by one of the Hawaiian members of the honorary advisory committee, has stated that he would be very pleased to send some of his paintings of Hawaiian scenes to the exhibition. Members of that committee selected from Hawaii are Wilbur A. Anderson, secretary of the Hawaiian Rubber Growers' Association; Dr. E. V. Wilcox, special agent in charge of the Hawaii Agricultural Experiment Station; F. T. P. Waterhouse, secretary of the Waterhouse Co., Ltd.; Albert Waterhouse, president of the Waterhouse Co., Ltd., and member of the board of commissioners of agriculture and forestry; W. P. Thomas, pineapple grower and packer; Jared G. Smith, tobacco grower and formerly special agent in charge of the H. A. E. S.; William Weinrich, fiber expert, and Daniel Logan, editor *Hawaiian Forester and Agriculturist*. Mr. Anderson is also officially listed as one of the patrons of the exhibition, along with the Earl of Derby and many other distinguished persons and associations throughout the world.

RUBBER IN HAWAII.

In a report by the Acting British Consul at Honolulu on the trade of Hawaii in the year ended June 30, 1912, which will shortly be issued, it is stated that rubber is steadily becoming a more important item of Hawaii's products. On the Island of Maui many trees have been planted, and these are now tapped in large numbers. Steady efforts are being made to improve the methods of preparation in order to increase the marketable value. During 1912, 35,000 were tapped, and altogether some 8,000 lbs. of rubber were expected to be produced, most of which will be exported. For 1913 an output of 20,000 lbs. is anticipated. Attention has been directed to an indigenous rubber tree (*Euphorbia lorifolia*), which grows in several localities, one place in particular on island of Hawaii having 6,000 acres, averaging 75 trees to the acre, whose product is 14 to 17 per cent. of rubber and 60 per cent. of resin (chicle). It is reported that the latex contains 42 per cent. of solid material, and that one man can collect 16 to 30 lbs. of crude product per day.—*Financier*, April 1.

THE KALO IN HAWAII (II).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

3. THE FLOWER.

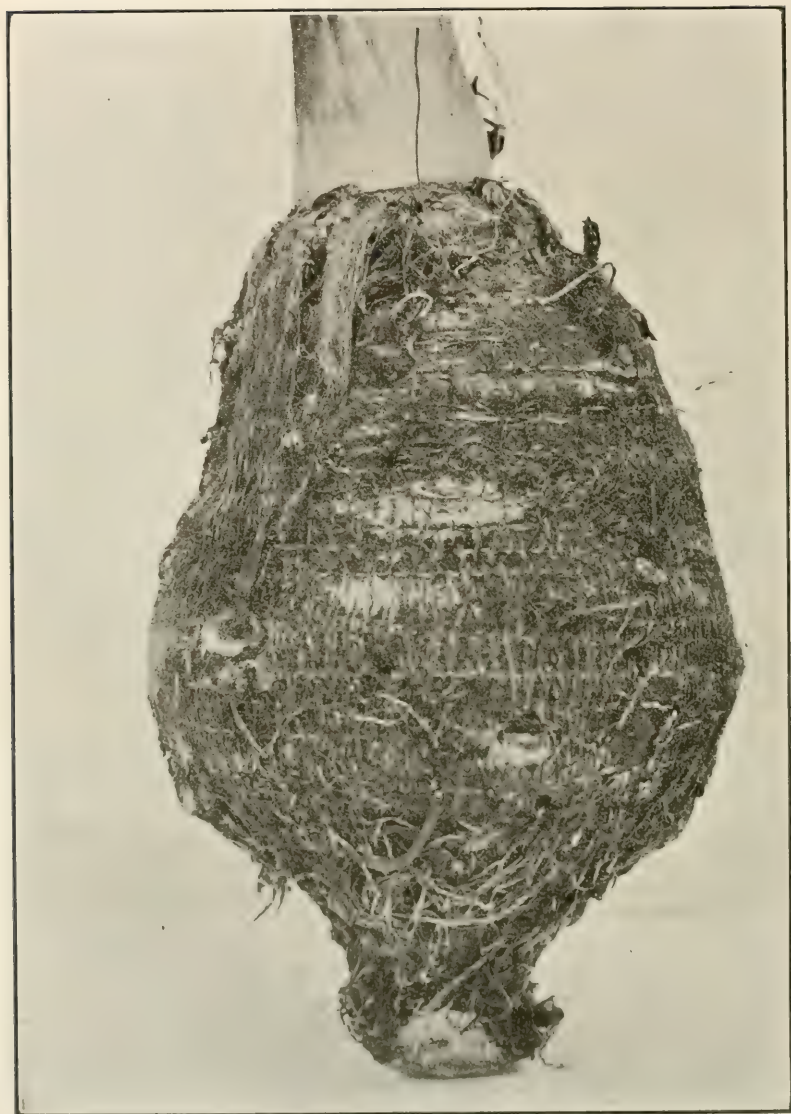
The production of flowers and seeds is uncommon in the case of the kalo plant. Like many other tropical plants, it has come to rely upon asexual, rather than sexual, methods of propagation. The plant develops vegetative rather than reproductive tissue. Plants that have a similar habit are banana, sugar cane, sweet potato, breadfruit, and *hau* tree. It is probably desirable, from the standpoint of the economics of the plant body, that flowering and seedage be suppressed, in such plants as the kalo. The part of commercial value is the corm, a vegetable part, which would suffer if material were drawn from it to nurture flowers and seeds.

When blossoming does occur in the cultivated kalo, the flowers appear shortly after the *huli* have been planted, and frequently before the leaves have appeared. In the wild kalo, flowering, if it occurs at all, is deferred until very late in the life of the plant. By *huli* is meant the large central bud that is cut from the top of the corm, together with the adjacent leaf-petioles, and is used to propagate the plant. This is the common type of *huli*; others are discussed under Propagation.

The flower arises, as do the leaves, from the center of the leaf cluster. It is yellowish or creamish in color, and resembles in shape and structure the calla lily or the *Monstera* flower. The central club-shaped order, or spadix, is enclosed by the pointed, hoodlike cover or spathe. The spadix bears the many small florets, staminate and pistillate. The extreme tip of the spadix is sterile, and is usually closely confined by the strongly twisted spathe. Fertile seeds rarely develop. The method of pollination is not known. It is interesting to know that the flowers of plants closely related to the kalo are pollinated by snails.*

Interesting contrasts will be discovered if one makes careful observations of the flowers of some wind-pollinated plant, such as sugar cane, bamboo, corn, sorghum, grass, coconut palm, and some insect-pollinated flowers, such as those of nasturtium, hibiscus, *hau*, *lehua*, and compare these with the kalo flower.

* The only snail occurring in the kalo patches of Hawaii is a large aquatic snail imported by the Chinese in recent years.



CORM OF *PTILOTE FLAULA*.

Weight, 915 grams; dimensions, 16.5 cm. long by 11 cm. diam. This is a type of corm found commonly in the markets.

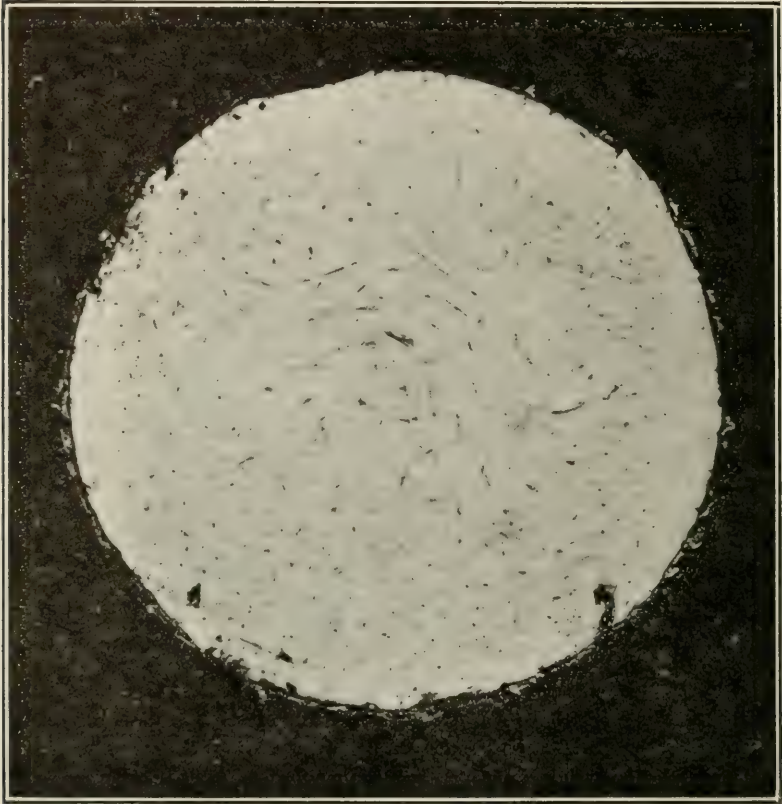
4. THE CORM.

It is for its starchy corm or "root" that the kalo is chiefly raised, although other portions of the plant have some value as food. A full-grown corm of average size is as large and as heavy as a large sweet potato. It is covered with a fibrous or scaly bark, especially towards the summit. Just beneath this outer bark is an inner layer, which may be white, rose, greenish, or purplish in color, depending upon the variety. The interior of the raw corm is usually light gray with a slight-bluish tinge, but in some varieties may be yellow, orange, rose, or even purple.

For many years the acrid or toxic effect of certain aroids was not understood. Professors Pedler and Warden, of the Department of Chemistry, Calcutta University, first demonstrated the presence and action of the calcium oxalate crystals. The following excerpts from their paper in the Journal of the Asiatic Society of Bengal, Vol. 57, Part II, No. 1, for 1888, prove of interest in this connection. Their experiments were performed upon *Colocasia virosa* Kunth, which at that time was called an *Arum*. After prolonged and varied chemical tests they stated that "The examination of the ash thus failed to afford us any clue to the physiological action of the fresh tubers.

"It now occurred to us that possibly the painful effect produced by *Arum* when in contact with the tongue, etc., might be due to mechanical causes. A microscopic examination of a section of a tuber revealed the presence of very numerous bundles of needle-shaped crystals, and we also found similar crystals in the leaves and stems. These crystals were seen under the microscope to be insoluble in cold acetic acid but easily soluble in cold diluted nitric or hydrochloric acid. * * * There appears to us to be no reason to doubt the fact, that the whole of the physiological symptoms caused by *Arums* are due to these needle-shaped crystals of oxalate of lime, and that the symptoms are thus due to purely mechanical causes. Bearing in mind the action of re-agents on calcic oxalate, the reason why mere boiling in water failed to deprive them of their activity is explained by the insolubility of oxalate of lime in water. Again, the action of dilute acetic acid, even at temperatures of 100 degrees C., in slightly lessening the activity of the tubers, is due to the very slight solubility of oxalate of lime in that acid. And, lastly, the complete loss of all physiological action when the tubers were treated with dilute nitric or hydrochloric acid is evidently due to the ready solubility of calcic oxalate in those mineral acids. And these assumptions, as we have already indicated, were fully demonstrated by the microscopic examination of sections of the tubers treated with the re-agents we have mentioned. One point, however, remains to be explained: we observed that, on drying, the tubers lost practically the whole of their physiological activity. Clearly there

could have been no loss of oxalate of lime on desiccation, and, as a matter of fact, we found as many crystals on microscopic examination of dried Arums as we had found in the fresh tubers. We explain this apparent anomaly in the following simple manner. In the fresh condition of the tubers, the bundles of crystals of oxalate of lime are cone-shaped, more or less, the sharp points covering a wide area, and forming the base, but in the drying of



STRUCTURE OF THE KALO CORM.

Transverse section through a corm of *Pi'iali'i ulaula*. The starch-containing parenchyma is quite moist, and very firm. The bark is both scaly and fibrous. The laticiferous tissue is conspicuous.

the tubers, the needles appear to arrange themselves more or less parallel to one another, and the sharp points thus cover a smaller area. And thus, instead of each crystal acting as a separate source of irritation and penetrating the tissues, the bundles act as a whole."

The acrid effect of the crystals, or raphides, is destroyed by drying, boiling, or steaming the corm.

Upon the outer bark may be seen the scars of former leaves. From these scars the roots commonly emerge. Small roots may be seen in the axils of the leaves still present if these leaves are pulled downward so as to expose the corm. The roots themselves are coarse, rather long and string-like, somewhat brittle, and whitish in color. "They contain little of the milky latex which fills most of the other organs of the plant."—Barrett. The roots bear a few branching rootlets. Kalo is not especially deep-rooted.

Young kalo plants sometimes develop from underground root-like runners sent out from the corm. Plants may also develop directly from the corm by budding. These lateral offspring are called *huli ohá*, or *huli pu'u*, and are described under the head of Propagation.

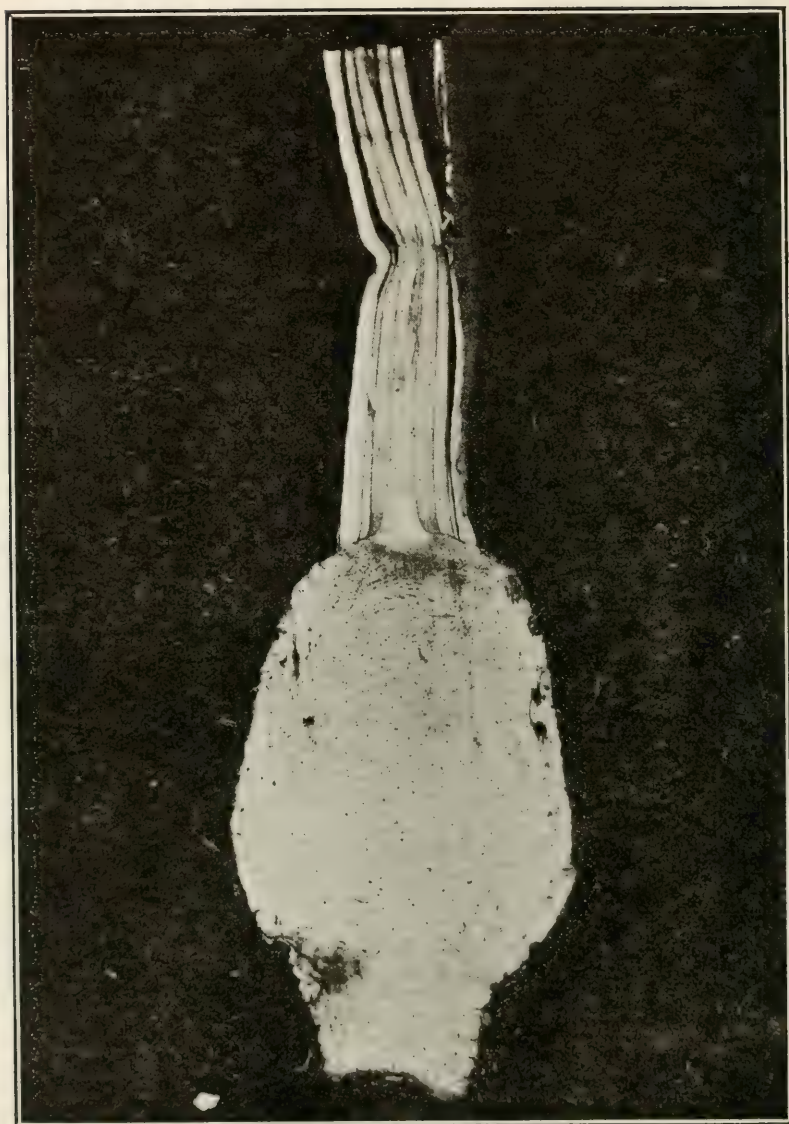
The corm, which because of its subterranean position is commonly thought of as a root part, is really a modified stem, as is demonstrated by the leaves which it bears. True roots do not bear leaves. Its swollen shape is due to the fact that it is stuffed with starch, which is the food part. Other familiar plants that store up large quantities of starchy or sugary material in their stems are: sago palm, cycads, sugar cane and potatoes.

This stored food is protected from the attacks of animals by its secure position within the wet soil, by the outer husk or bark, and by the protective layer of minute, needle-like crystals of calcium oxalate. These occur both in the leaves and in the outer layer of the corm.* Anyone who has inadvertently eaten kalo that has been insufficiently cooked, can attest to the prolonged and sharp prickling irritation, as though one's mouth and throat were veritably "full of needles."

5. BOTANIC STATUS OF KALO.

The botanic name for kalo is *Colocasia antiquorum* var. *esculenta* Schott. This means that it is a member of the genus *Colo-*

* The use of root crops as food by primitive peoples is interestingly described by O. F. Cook as follows: "The root crops that were domesticated in America stand in distinct contrast with Old World root crops, both in number and in quality. The species cultivated in the Old World were relatively few, mostly the seed-propagated garden vegetables of temperate regions, such as radishes, turnips, beets, parsnips, carrots, etc. The temperate root crops domesticated in the Old World were mostly capable of being eaten raw, as though they had been used first by people unaccustomed to use fire for cooking vegetables. The root crops that were domesticated in America are not eaten raw by the natives. Many of them are disagreeably acrid in the raw state, like the aroids, or even positively poisonous, like the cassava. Very few new types of plants appear to have been domesticated as root crops in the Old World Tropics, and none of them have attained the prominence of several of the American species. The banana appears to have been cultivated first as a root crop, and some of the varieties are still cultivated for their root-stock in New Caledonia and in East Africa."



STRUCTURE OF THE KALO PLANT.

Longitudinal median section, through petioles and corm. The marks in the corm are due to the latex, which turns brown when the latex tubes are cut and exposed to the air. Note the triangular mass of embryonic tissue, centrally located amidst the bases of the petioles. From this region the foliage and floral organs are produced. This kalo is *Pi'iali'i ulaula*.

casia (which is the old Greek name for plants of this general type). The specific name *antiquorum* indicates the antiquity of its cultivation, for kalo was among the plants first used by mankind for food.

There are several varieties of this species, as shown in the botanic synopsis given later. The kalo of Oceanica and Hawaii is the particular variety *esculenta*, so-called because of its extensive use as food. The botanic name for kalo was given it by the German botanist Heinrich Wilhelm Schott, who lived during the years 1794-1865, and who made a careful study of the plants of this group.

The Hawaiians had a number of poetical appellations descriptive of the kalo. Among these is "*ka i'a i'wi ole*," which means "the fish without bones." This refers to the importance of kalo in the diet—it held the same high rank among the vegetable foods that fish held among the flesh foods.

SOME SUGGESTIONS REGARDING THE CARE OF MILK AND CREAM IN THE HOME.

(Press Bulletin No. 42, the University of Nebraska Agricultural
Experiment Station.)

By J. H. FRANSEN.

Sanitary milk is milk produced from healthy cows under conditions which prevent all outside contamination. The production of clean and healthful milk is the most important subject with which the dairyman has to deal. Considered from an economic standpoint, we find milk produced under absolutely sanitary conditions selling for practically double the ordinary price. Needless to say, for the production of sanitary milk the dairyman must have healthy cows, a sanitary barn, clean bedding, dust-free air, a clean barnyard, and clean cows. He must have clean and healthy milkers, clean milk vessels, and pure water. He must feed clean, wholesome feeds and must have a sanitary milk-room and abundant facilities for cooling the milk and cream. However, if carelessly handled in the home the milk or cream may quickly become unfit for food. The fact that such large quantities of good milk have been spoiled in the home by improper treatment after delivery prompts the writer to emphasize some of the points regarding care of milk and cream in the home.

Milk and cream readily absorb odors and collect bacteria and other impurities whenever they are exposed to the air or placed in utensils that are not scrupulously clean. If this fact is generally understood it can easily be seen why it is so objectionable to store uncovered milk in refrigerators or cellars, where it comes in contact with vegetables or other food products possessing

strong odors.. Milk is almost a perfect food for human beings. It is also a perfect medium for the development of certain bacteria which may gain access to it from the dust-laden air, from flies, and from unclean utensils. Some of these bacteria may be the germs of contagious diseases; others may cause digestive disorders, especially in infants and young children whose diet is largely milk.

Experiments have shown us that many germs which gain access to the milk develop very rapidly while the milk remains warm. By this we mean at a temperature above 50 degrees Fahrenheit. For instance, milk kept at 45 degrees F. may be kept perfectly sweet for twenty-four hours, while if kept at a temperature of 70 degrees F. it may sour in less than six hours. This emphasizes the importance of low temperatures in the preservation of milk and cream.

The following brief rules should enable the consumer so to care for the milk as to have an article that is at all times sweet and wholesome:

1. If possible, purchasers should insist on getting milk in a bottle or other originally sealed package. Milk dipped out of a can in the street may gather large numbers of bacteria from the dust and impurities in the air falling into it.
2. Never allow the milk to stand in a warm place for any length of time, but place as soon as possible in a refrigerator, ice box, or other cool, clean place.
3. Keep the milk or cream in the original package until needed for use.
4. Carefully wipe the mouth of the bottle before pouring milk or cream from it.
5. Do not pour back into the bottle any milk which has been exposed to the air.
6. Keep the bottle covered with a cap or an inverted tumbler as long as any milk remains in it.
7. Do not expose uncovered milk in refrigerators containing foods having a strong odor.
8. Wash milk bottles as soon as empty and do not use milk utensils for any other purpose.
9. Wash milk bottles in pure water and do not wipe with dish towel. It is better to scald them in clean water and set away unwiped to dry.
10. Special precautions should be taken with the baby's milk bottles. They should first be rinsed in lukewarm water, then washed in hot water containing a little soda, and then scalded. In selecting a feeding bottle, choose one with a wide mouth and no corners. Never use rubber tube between the bottle and the nipple.

11. In case of contagious diseases in the house, such as typhoid, scarlet fever, or diphtheria, return no milk bottles to the milkman without the permission of the health officer.

ADVANTAGES OF GOOD CULTIVATION.

Mr. B. G. Brooks, Instructor in Agriculture, has contributed the following article to the *Queensland Agricultural Journal* of February, 1913:

In the successful raising of farm crops the management of the soil is of the greatest importance. It is only necessary to observe the variations in the yield of similar crops on adjoining fields to find that, were up-to-date methods more generally practised in the preparation of the soil, the returns per acre would be materially increased.

When a crop fails the cause is, unfortunately, too often set down to adverse climate conditions. Although the weather has undoubtedly a very important bearing upon crop production, yet it is not always responsible for the poor returns.

In my travels throughout the various districts of the State, I have ample opportunity of studying the respective methods practised in the raising of crops and the results obtained thereby.

It is not an infrequent occurrence to come across a farmer harvesting a very heavy crop on one side of the fence, while his neighbor on the other, on similar soil, is reaping practically a failure. It is, therefore, necessary to look to some cause other than the weather for this disparity. Perhaps there is some truth in the remark made by the farmer who was harvesting a fine crop while his neighbor was reaping a poor one. When asked the reason for the difference, his reply was, "I cultivated my soil—my neighbor irritates his."

The problem relating to soil fertility and crop production has received much attention from agricultural scientists during recent years, and although much has been achieved, there still remains a very large field for investigation. Much prominence has been given, both in Australia and America, to the raising of crops with a minimum amount of rainfall, and it must be admitted that marvelous results have already been secured by the adoption of the methods advocated.

The foundation stone upon which the success of the dry-farming system rests is fallowing—that is, keeping the soil cultivated and only taking a crop every alternate year.

So far, fallowing has received little or no attention in our State. On the other hand, the practice of securing two crops during the year is quite a general one, and this is undoubtedly, to a large extent, responsible for the low average yield obtained from some of our staple crops. I find that one of the most important factors in successful crop production is the early preparation of the land,

but, with the system of double cropping just mentioned, this cannot be given effect to. I am not inferring that cultivation is carried out in a slipshod manner, for it may be that every care has been taken in plowing and pulverizing the soil to form the necessary seed bed, but, unless a certain period is allowed for the soil to "mature," or, in other words, to permit of the necessary plant food becoming available for the needs of the crop, it is impossible to secure a full return.

This point is not at all difficult to demonstrate. It is only necessary to take a quickly maturing crop, such as *Panicum*, and watch results. As an example, I will relate one experience of many I had, showing the effect of early and late preparation. In a field of 30 acres, 10 were plowed four months; 10, two months; and 10, just previous to planting. The whole area was planted with *Panicum* at the same time. The result in green material cut for silage was: for the four months, 12 tons per acre; for the two months, 6 tons per acre; and for the portion plowed previous to planting, nil.

Although the weather was very favorable during the growing period, the seed on the freshly plowed area practically refused to germinate—only a few small patches appearing where timber had been burned off. This failure of seed to germinate when sown in newly-plowed land, more especially where the soil is of a stiff character, has often been observed. Germination will eventually take place, but it may be weeks or months later. Numerous examples of a similar nature were to be met with in the 1911 wheat crop, and to a lesser extent during the past season. In every district individual fields were to be met with giving a good yield, while adjoining areas were practically a failure. On investigation it was discovered that, in almost every instance, early preparation of the land was responsible for the successful returns.

HAMPTON INSTITUTE'S WORK FOR NEGROES.

Hampton Institute's remarkable results in training negroes are vividly set forth in the forty-fifth annual report of the principal, just made public. From a school of 15 pupils and two teachers, the Institute has grown into a busy educational village of over a thousand persons, with a far-reaching influence, not only for the races it is designed to aid, but for the whole nation, which benefits by the splendid work and example of Hampton graduates everywhere.

Industrial training is the keynote of the Hampton success, according to Dr. P. P. Claxton, United States Commissioner of Education, who is keenly interested in the Hampton work. It is noteworthy that this industrial training is of the most immediate and practical sort, applied to the ordinary producing tasks of life,

first of all in the educational plant itself. At Hampton practically all the work is done by the students themselves. There are buildings to be kept in repair and occasional new buildings to be erected; there is a farm of 600 acres to be cultivated, with 150 cows and young stock, 40 horses and mules, hogs and poultry. There are horses to be shod, harness to be kept in repair, wagons to be built, boys to be clothed—these are a few of the industrial opportunities which the plant itself offers. Last year the students received over \$86,000 in wages, of which about one-fourth went to the girls for domestic work in the Institute.

This year the boys of the trade school have built Clarke Hall at a contract price of \$26,142. The work called for the services of bricklayers, plasterers, carpenters, sheetmetal workers, steam-fitters, plumbers, cabinetmakers, electricians, and painters. The architect who designed the building, after inspecting the brickwork done by the boys, said it compared favorably with similar work by New York men; and some of the local builders pronounced it the best piece of work done in that section of Virginia.

At Hampton work is considered a privilege; in fact, one form of punishment is the taking away of work from a pupil. No student is ever punished by being forced to work. At the same time, labor is not insisted on as an end itself, but rather as the means to an end. "The aim of Hampton," says Dr. George P. Phenix, vice-principal, "is not merely to train workmen, but to educate men and women who shall stand for the best things in the communities to which they return, and who can make their skill contribute to this end."

MATERIAL FOR MAKING PAPER.

Wood-pulp is by far the most important material for making paper at the present day, and, owing to the wide distribution of the sources of supply—coniferous trees being the most suitable—it is the cheapest. Large quantities of straw-pulp also are imported into this country for the manufacture of brown papers and straw boards; and bamboo is coming into prominence as a source of paper-pulp. A new material for making paper, "elephant-grass," from Uganda, is now suggested in an interesting article published in the current quarterly issue of the *Bulletin* of the Imperial Institute. This is a perennial grass, growing usually to a height of 6 ft. to 10 ft., and much higher on rich marshland. Occurring in a deep zone across tropical Africa, it is found chiefly along watercourses and in marshy depressions; but it grows also in the more open parts of bush and forest land. Both cattle and horses eat it readily. A sample of the dried mature grass was sent recently from Uganda to the Imperial Institute, with the object of ascertaining its suitability for the manufacture

of paper. The Chief Forestry Office of the Protectorate stated that the grass was a source of annoyance and expense to agriculturists, as it grew rapidly after the aerial shoots had been burnt or cut down; but that, if it could be used profitably for the manufacture of paper, a new and large industry could be built up. Since this grass is available in immense quantities, and at present has to be burnt each season in order to keep it down, it is important to find a commercial use for it.

The consignment, which weighed 177 lbs. when received at the Imperial Institute, and 145 lbs. on being air-dried, yielded, after treatment in the laboratories, a pulp of good color, composed of ultimate fibers rather longer than those of esparto grass and about the same length as those of bamboo pulp. It furnished a fairly good paper. Owing to the light and bulky nature of "elephant grass," however, it is unlikely that the stems could be shipped profitably to Europe for paper-making; but if the stems were converted into pulp at or near the sources of supply, by treatment with caustic soda, it is possible (in the opinion of experts) that a remunerative industry could be opened up, since the pulp probably would be approximately the same value for paper-making as wood-pulp prepared by the soda process—namely, £7 10s. to £8 12s. 6d. per ton in London (February, 1913). Since there are immense deposits of soda in East Africa which could be utilized for the manufacture of pulp, there would appear to be some prospect of a new industry's growing up in this Protectorate.—*The Mail*.

Hawaiian Gazette Co.

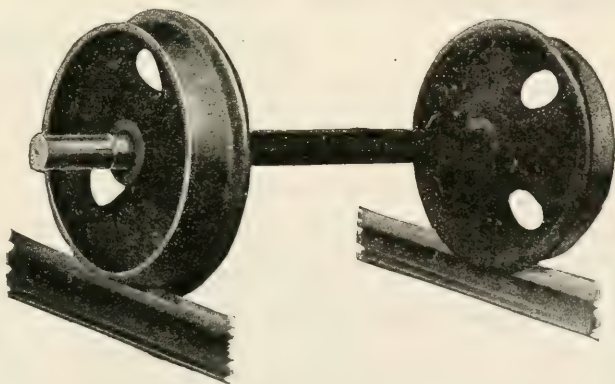
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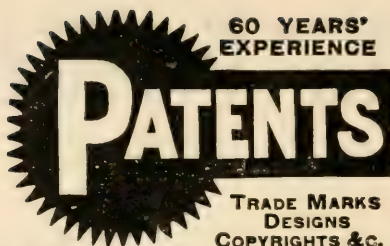
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Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables, etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

PUBLICATIONS FOR DISTRIBUTION—Continued.

- *Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
- "Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.
- "The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price \$1 a year.

DIVISION OF FORESTRY.

- *"Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
- *"Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
- "An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
- "Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
- *"Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
- "Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
- "Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
- "Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
- Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
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- Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
- Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
- Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

- "The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
- ** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
- * "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
- "A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
- "The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
- Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
- Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
- Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
- Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
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- * "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
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- "Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

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THE HAWAIIAN FORESTER AGRICULTURIST

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SEPTEMBER, 1913.

No. 9.

In this number will be found the detailed reports of President Giffard to his fellow-commissioners of the Board of Agriculture and Forestry, regarding the distribution of the Silvestri fruit fly and horn fly parasites on the different islands. They show just what is being done in the campaign against the pests mentioned. The president is duly cautious in anticipation of results, although adopting a hopeful tone from the history of other parasitical work in these Islands. He points out, however, that it will take time for the parasites to prove their value. It will never do to allow the campaign to be hampered for lack of funds.

The Forester acknowledges with appreciation the receipt of several numbers of Vol. 2 of the Agricultural Journal of the department of agriculture and forestry, Republic of China, printed entirely in Chinese characters excepting a few scientific terms and the captions of cuts, the latter being of imported Hereford cattle, views of forestry work, etc. Before receiving these numbers an item sent from Washington was in type, mentioning that the Chinese republic had established a department of agriculture and forestry. The fact that its journal is in its second volume indicates that the department is coeval in origin with the republic itself.

For the information of new readers, it may be mentioned that the treatise on "The Kalo in Hawaii," by Messrs. MacCaughy and Emerson, began in the July number.

In this number appears for the first time the monthly reports of the Division of Hydrography, which was added to the bureau of agriculture and forestry by legislation of this year. The importance of Hawaii's water resources will place the hydrographic reports among the most interesting and valuable contents of the Forester.

With a distribution of 6150 plants to the public and 25,000 seedlings to planting and other corporations, in the months of July and August, the nursery of the Division of Forestry has well maintained its record of efficiency. The reports of the division

for the two months will show much other work of great value in hand, such as the replanting with the native trees, koa and kukui, of the Tantalus heights, and the assistance being proffered the military authorities in planting trees and ornamental shrubs at army posts.

Few people realize the protection Hawaii receives from the Division of Entomology against the constant invasion of a motley army of pests, which is successfully repelled every month by that branch of the agricultural service. The gravity of the menace can be partly understood from a perusal, month to month, of the category of pests intercepted. How many people stop to think of the consequences should one in a score of those pests pass the barriers?

An important discovery would appear to have been made by the territorial veterinarian with regard to the disease that has been decimating the working mule stock of plantations on Maui. His theory that a parasite derived from impure feed and water is the common cause of cerebro-spinal meningitis and maladies having allied symptoms thereto may, it is hoped, lead to preventive if not curative means that will stamp out all such infection.

In totally eradicating glanders from Waipio valley, Hawaii, within a year past, the Division of Animal Industry has scored a great triumph. It is seldom that such a mess as was found in that region has to be cleaned up.

While reporting that bovine tuberculosis is steadily on the decrease on this island of Oahu, Dr. Norgaard is recommending plans to make the campaign still more effective.

DISTRIBUTION OF PARASITES.

Following is the text of reports by President W. M. Giffard, of the Board of Agriculture and Forestry, addressed individually to the Commissioners, Messrs. J. M. Dowsett, A. H. Rice, H. M. von Holt and A. Waterhouse, relative to the distribution of parasites:

September 11, 1913.

Herewith enclosed I beg to hand you statements of certain distribution of horn fly and fruit fly parasites during the past three months. In view of the fact that the introductions of the original colonies of these parasites were comparatively small I consider that the Board should feel gratified at the success attained in their multiplication in our insectaries. Much time and labor has

been consumed by both Messrs. Fullaway and Bridwell to bring about continued success of the breeding experiments so satisfactorily inaugurated by Prof. Silvestri. The latter entomologist, as you are aware, left for his home in Portici, Italy, in the middle of June and since that time the breeding has been in charge of Mr. D. T. Fullaway, the entomologist loaned the Board by the Hawaii Experiment Station. The necessity of securing additional entomological assistance was at once made very apparent upon Prof. Silvestri's arrival here with the parasites he had discovered in Africa, and for that reason the services of Mr. Fullaway were requisitioned by the Board as above stated.

Owing to an unexpected reduction in the appropriations from which the entomological expenditures of the Board are drawn, it was at first contemplated that we could not continue the breeding and distribution of these parasites beyond September 30, but having interviewed Governor Frear relative to this matter he strongly urged that the Board, if at all possible, continue this special work for another three months. As I deem it of the utmost importance that the multiplication and distribution of these Silvestri parasites should not at this stage of the experiments be stopped, I earnestly recommend continuation of the insectary work until December 31 and continued, if necessary, longer than that period if funds are available.

In the meantime I am notified by Mr. Fullaway that he has been ordered by his station to go to the Philippines on special entomological work for the Federal authorities, and as he will leave for those islands about the middle of next month I have made arrangements to have Mr. Bridwell, one of the Board's entomologists, take charge of the work for the time being. I have no doubt that the breeding of the parasites will continue satisfactorily under his immediate charge.

I also desire to say that, although the enclosed lists of distribution of both horn fly and fruit fly parasites show that apparently large numbers have been distributed to the various islands, it does not necessarily mean that these will all become established. We are already aware of the establishment of one or more of these parasites in localities near Honolulu where we have been able to give close attention to the conditions of host material before liberation, but this in no manner means, as yet, that the establishment is considered quite satisfactory nor that it is in any way general wherever liberations have been made. To ensure success at all (if success is at all possible) many more thousands of each of the parasites will have to be bred and liberated, and if not liberated under the most ideal conditions as to the presence of the host pest in its proper stage of growth there is always a grave chance that the colonies liberated will produce negative results. Neither must it be supposed that a perceptible diminution of the numerical strength of the pest is to be looked

forward to in the very near future. It takes many millions of parasites established generally over all areas to begin to do what may be called effective work, and it takes a year and more often longer to bring about such a condition even if our climatic conditions and general environment are suitable for the multiplication of parasites liberated under natural conditions. The leaf hopper pest was not in any way controlled by parasites until the second year after their liberation and the same can be said of the cane borer parasite, which, although established and doing good work, has not yet multiplied to the extent that is required to make it absolutely effective in all sections where it was liberated a couple of years ago. As I have repeatedly informed the Board and the press, parasitic work both in the field and in the insectary is altogether problematical. To be successful the natural conditions similar to those which the parasite has been accustomed to in its native habitat must be as near perfect as possible, and even then the percentage of efficiency of any one parasite may be quite small, in which case it would necessitate the introduction of other species so that all of these combined could bring the parasitization of the pest up to a satisfactory percentage and make relief perceptible. The fact that Prof. Silvestri discovered in West Africa at least two other species of fruit fly parasites of a different habit of parasitization from those he successfully introduced here is quite encouraging, notwithstanding the further fact that these two species did not survive the long voyage and changes of climate between Africa and Honolulu. As these particular species are reported by Silvestri to be even more satisfactory than those he introduced here, it is to be hoped that the Board's funds will be such that that entomologist may be engaged for another expedition to Africa next year. In the meantime an entomologist under Silvestri's direction began research work on the horn fly and its parasites along the Mediterranean and vicinity on August 1. It is yet too early to report any results as to this feature of the parasitic work.

In conclusion I would say that late advices received from Prof. Silvestri indicate that his official report in the shape of a "Bulletin" will be ready some time next month. As soon as it is received it will be published in bulletin form and distributed.

Yours truly,

W. M. GIFFARD,
President and Executive Officer Board of Agriculture and Forestry.

DISTRIBUTION OF HORN FLY PARASITES.

(June, July, August and to Sept. 8, 1913.)

Oahu.

| | |
|-------------------------------------|-----|
| Honolulu—Manoa (College Dairy)..... | 32 |
| Manoa (Boyd's) | 300 |
| Waialae (Isenberg's) | 200 |
| Sheridan Street (H. D. A.)..... | 50 |
| Nuuanu (Dowsett D.)..... | 225 |
| Niu (Lucas' Dairy)..... | 100 |
| Honouliuli—O. R. & L. Co..... | 200 |
| Waianae—Waianae Sugar Co..... | 100 |
| Kunia—O. R. & L. Co..... | 200 |
| Kawailoa—O. R. & L. Co..... | 100 |
| Waimea—O. R. & L. Co..... | 100 |
| Kahuku—O. R. & L. Co..... | 200 |
| Mokuleia—Pond's Dairy | 200 |

Hawaii.

| | |
|--|-----|
| Waimea, South Kohala—Parker Ranch..... | 400 |
| Pahala, Kau—Hawaiian Agricultural Co..... | 400 |
| Kukaiaua, Hamakua—Kukaiaua Ranch..... | 200 |
| Hilo—Including Hilo Boarding School..... | 300 |
| Keau, Puna—Shipman's | 200 |
| Naalehu, Kau—Hutchinson Sugar Plantation Co..... | 200 |
| Mauka Hoonaunau, Kona—J. Paris..... | 400 |
| Puulehua, 4200 ft.—A. Greenwell, Kona..... | 400 |
| Puuwaawaa, Kona—Hind's Ranch..... | 400 |
| Huehue, 2400 ft., Kona—J. Maguire..... | 400 |

Kauai.

| | |
|--|-----|
| Lihue—W. H. Rice..... | 300 |
| Wailua Falls—Lihue Plantation..... | 200 |
| Lihue Falls—Hills' Soda Works..... | 100 |
| Lihue—Lihue Plantation makai field..... | 200 |
| Puunana—Grove Farm | 400 |
| Kilauea—Kilauea Plantation | 400 |
| Homestead—McBryde's Pineapple Cannery..... | 100 |
| Makaweli—Gay & Robinson..... | 200 |

Lanai.

| | |
|--------------------------------|-----|
| Koele—Lanai Ranch Company..... | 100 |
| Kopo—Lanai Ranch Company..... | 100 |

Molokai.

| | |
|----------------------------------|-----|
| Kaulawai—Molokai Ranch Co..... | 500 |
| Kaunakakai—Molokai Ranch Co..... | 100 |
| Kualapuu—Molokai Ranch Co..... | 200 |

Maui.

| | |
|--|-----|
| Makawao—Haleakala Ranch Co..... | 300 |
| Makawao—Ulupalakua, Cornwell Ranch..... | 600 |
| Pohakupuli, Lahaina—Honolua Ranch..... | 200 |
| Honokowai, Lahaina—Honolua Ranch..... | 200 |
| Puumakaiole, Makawao—Haleakala Ranch Co..... | 300 |

DISTRIBUTION OF FRUIT FLY PARASITES.

(June, July, August and to Sept. 8, 1913.)

Oahu.

| | |
|--|------|
| Honolulu—Nuuanu (Gartley's), Chalcids..... | 2400 |
| Queen Emma Park, Chalcids..... | 50 |
| Moanalua, Proctotrupids | 4260 |
| Manoa (Cooper's), Chalcids..... | 1950 |
| Upper Manoa, Proctotrupids..... | 400 |
| Pauoa (Booth's), Proctotrupids..... | 400 |
| Wahiawa—Proctotrupids | 100 |
| Waianae—Australian Opus | 3 |

Hawaii.

| | |
|---------------------------------|------|
| Kona—Chalcids | 1085 |
| Proctotrupids | 2080 |
| S. A. Opus..... | 3 |
| Australian Opus | 10 |
| Hilo—Proctotrupids | 500 |
| Honokaa—Chalcids | 200 |
| Naalehu—Proctotrupids | 200 |

Kauai.

| | |
|---------------------------------|-----|
| Waimea—Chalcids | 140 |
| Proctotrupids | 300 |
| Lihue—Proctotrupids | 500 |
| Hanalei—Proctotrupids | 100 |

Maui.

| | |
|---------------------------------|-----|
| Lahaina—Proctotrupids | 80 |
| Wailuku—Proctotrupids | 220 |

MONTHLY STATEMENT PARASITES LIBERATED.

| | Horn Fly | Chalcids | Proctotrupids |
|-----------------------|----------|----------|---------------|
| June 24-30, 1913..... | 80 | 150 | 180 |
| July, 1913 | 2450 | 1920 | 2800 |
| August, 1913 | 6000 | 2360 | 4930 |

TOTAL NUMBER OF PARASITES LIBERATED.

(May 16th to Sept. 8, 1913, Inclusive.)

| | |
|-------------------------------|--------|
| Horn Fly | 9 830 |
| Fruit Fly—Proctotrupids | 9,140 |
| Chalcids | 5,825 |
| Opus | 20 |
| | <hr/> |
| | 24,815 |

DISTRIBUTION OF FRUIT FLY PARASITES BY W. M. GIFFARD IN KAU AND KONA DISTRICTS. LOTS PER MAUNA KEA VIA HILO AUGUST 9 AND PER MAUNA LOA VIA KAILUA AUGUST 13.

Mauna Kea Lot.

August 11—W. G. Ogg, Pahala, Kau. Two vials approximately 50 Procs. liberated under two bearing coffee trees in Mr. Ogg's garden. No other fruit present at the time but a few ripe coffee berries.

August 11—George Gibb, Naalehu, Kau. Six vials approximately 150 Procs. liberated under mango trees in his garden. Oranges, limes and mangoes in season but only mangoes found infested. Peach season over. Some coffee coming into season in a few weeks.

August 12—Liberated one vial approximately 25 Procs. on Kona government road about 2 or 3 miles on the Kau side of Hoonau among infested guava and coffee.

N. B. Fruit in the Kau district was scarce at this time. Small patches of coffee here and there; will be in season shortly. Not much wild guava fruit seen.

Mauna Loa Lot.

August 13—Capt. Cook Coffee Company, Kealakekua, Kona. Six vials approximately 125 Procs. liberated by the manager (Macfarlane) in the mauka coffee fields of Kaiwaloa at about 1800 feet elevation.

August 13—Robert Wallace, Kealakekua, Kona. Five vials approximately 125 Procs. liberated by me personally in the Kynnersley field of coffee just mauka of Julian Yates' house at Kealakekua near government road. In and near this field where I liberated these parasites are numbers of peach trees but not in bearing at this time.

August 14—On the morning of departure for Kau, Mr. Wallace and I together liberated 16 vials approximately 250 Procs. in large coffee field immediately opposite Mr. Wallace's house.

N. B. All the fields where these parasites were liberated con-

tained both ripe and unripe infested coffee berries. The crop in general on or near government road was not yet sufficiently ripe for harvesting although there had been some few small pickings in many fields. In all the fields there were dropped berries in more or less quantities. Owing to heavy rains during visit in Kona I found it impossible to investigate the "Opus" experiments. Mr. Wallace, however, assured me that instructions as to placing and taking off the nets on the trees had been complied with. As a matter of fact too short a time had elapsed since the liberation of the "Opus" parasites to make it worth while investigating for parasitized larvae. I think, however, that it now would be interesting to secure small quantities of coffee berries from some of the trees in the immediate neighborhood of where these special parasites were liberated and to work these out for possible parasites in the insectary. During my visit in Kona I arranged a meeting with Mr. Macfarlane of the Capt. Cook Coffee Company and concluded an arrangement with him whereby he would be willing to defray his portion of the expense incurred by reason of our having previously bargained with Japanese and other planters to each set aside a $\frac{1}{4}$ acre (approximately) of bearing coffee trees wherever the "Opus" parasites had been liberated. Messrs. Hackfeld & Company having already practically agreed to the same course, provided Mr. Macfarlane also concurred, the Board has been saved considerable funds which would otherwise have had to be expended to reimburse the Japanese and others for the crops on the $\frac{1}{4}$ acres referred to. There were five or six of these areas reserved from the present crop pickings, the reservation being allowed for a period of approximately three months.

W. M. GIFFARD.

Honolulu, Sept. 1, 1913.

DISTRIBUTION OF HORN FLY PARASITES BY W. M. GIFFARD IN HILO, PUNA, KAU AND KONA BETWEEN AUGUST 9 AND 15, 1913.

Six vials containing approximately 600 horn fly parasites taken on Mauna Kea August 9, 1913, and distributed as follows:

August 10—Keanu Ranch, Puna, W. H. Shipman, owner. Two vials 200 parasites liberated in cow pen at lower end of ranch. Conditions as to future liberations could be improved by gathering and placing manure in special enclosure. Present conditions not altogether satisfactory because of cattle tramping down the droppings in the pen.

August 10—Kapapala Ranch, Kau. One vial, 100 parasites, to Julian Monsarrat. To prevent delay in transporting the other parasites further into the Kau district I had no opportunity to break my journey and inspect the conditions for liberation on this ranch which is located off the government road. I explained

to Mr. Monsarrat in person what was most desired as to condition of cow droppings, and he promised to get to work on these at once.

August 11—Hawaiian Agricultural Co., Pahala, Kau; W. H. Ogg, manager. One vial, 100 parasites. Upon inspection conditions were not found altogether satisfactory in the enclosure selected by Mr. Ogg for liberation of the parasites. I therefore withheld a portion of the parasites intended for that place and distributed them elsewhere. The enclosure is at the corner of a large pasture which cattle frequent daily, $\frac{1}{4}$ mile east of the mill near Chinese graveyard. I found much manure piled in the enclosure but as yet no pupae. Suggested that in future manure be spread only 6 inches deep in enclosure and that intervals of a few days take place between each spreading. Mr. Ogg is much interested in the establishment of the parasite and is taking particular pains to arrange conditions properly for future liberations. I would suggest that, at as early a date as possible after due notice from him, we send him a strong colony. I fear that those I liberated there will not multiply satisfactorily as pupae were scarce at the time. The same may be said of the previous lot sent him via Hilo and the Volcano House. These were placed in an open pasture where droppings were more or less tramped down by cattle.

August 11—Hutchinson Sugar Plantation Co., Naalehu; Geo. Gibb, manager. Two vials, 200 parasites. Practically the same conditions applied here as at Pahala. The droppings were unsatisfactory and but few pupae seen. The manager has selected an enclosure in the bullock pen about 1000 feet away from the road leading to manager's house. Water is in close proximity and the adjoining pasture is fairly stocked with cattle. As the manager promised to have gathered a larger quantity of suitable manure and placed in the enclosure I agreed, if possible, to liberate parasites there again upon my return trip from Kona.

August 13—Received 15 vials, approximately 1500 parasites, at Kealakekua via Kailua per Mauna Loa.

August 13—W. H. Greenwell Ranch, Kona. Three vials, 300 parasites, were sent by me through one of the Greenwell boys to the Puulehua section of the ranch, ten miles mauka from Kealakekua, at 4200 feet elevation. Conditions were said to be good up there as to manure because of the dairy, 100 cows being milked daily. Besides this the regular range of the ranch is in that section. Upon inspection of the home dairy at the homestead on the government Kona road I found conditions for liberating altogether unsatisfactory and, as horn fly at the time was not bad anyway in the latter place, I decided to have the parasites liberated in the Puulehua section above referred to.

August 13—John Paris Ranch, Kona. Three vials, 300 parasites, were given by me to Mr. Paris for him to take personally

to the mauka cattle range where they were not only most needed but where horn fly was more of a pest than at the homestead at Kealakekua. The section referred to is at a high elevation at Hoonau, and full instructions as to conditions and liberation were personally explained to Mr. Paris. His small cow pasture at Kealakekua was not at this time satisfactory for liberation of parasites there.

August 13—John Maguire Ranch, Puuhi, Kona. Three vials, 300 parasites, delivered to manager for liberation. Report as to location has since been received by the office.

August 13—R. R. Hind's Ranch, Puuwaawaa, Kona. Three vials, 300 parasites, delivered to manager for liberation. Same written and verbal instructions given to the Hind's and Maguire's ranches as in the other cases.

Note—A very heavy rain storm which occurred all the day of the 13th prevented my riding over any of the ranges to inspect present conditions as to pupae of the fly. It would be well to send all the Kona as well as the other Hawaii ranch managers copies of the new directions for preparing manure enclosures before parasites can be liberated. Upon due notice being received that the manure pile will have more or less pupae by a certain date efforts should be made, if possible, to send parasites to them in care of purser after wirelesslying the managers that this is being done.

August 14—Upon return to Kau district liberated as follows: Three vials, 300 parasites, more or less (some of these vials contained a less number of parasites than others received). These were liberated under better conditions in the Hutchinson enclosure at Naalehu previously referred to.

Note.—I delivered on August 10 to Brother Matthias at Hilo the following parasites brought up with me on the Mauna Kea, viz: 200 Chalcids for Hamakua district, 100 horn fly parasites for Kukaiau, 100 horn fly parasites for Hilo. Reports as to the liberation of these will come directly from Brother Matthias.

W. M. GIFFARD.

Honolulu, Sept. 1, 1913.

Austria not only sells timber, but timber products from its forest lands, and disposes of about 3,500,000 railway ties a year. There is no provision in the United States by which the national forests can dispose of manufactured lumber, though the policy of selling standing timber is well established.

The Canadian government has supplied twenty-five million tree seedlings to farmers, principally in the Alberta and Regina plains region. The United States does not supply young trees to the public, except in a limited area in Nebraska, under the terms of the Kinkaid Act.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, July 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of July as follows:

Hog Cholera.

The suggestion contained in my report for last month in regard to the origin of the recent epidemic of virulent hog cholera on the Island of Oahu, and to the effect that the outbreak is due to a recrudescence of the mild chronic form of the disease which has been known here for years, seems to be confirmed by the fact that no complaint has reached this office of imported hogs being sick or developing the disease after arrival here, nor has it been possible to trace the disease to any of the recent importations of hogs, which have, besides, been few and far between.

The Board's decision to promulgate a regulation to prevent the spread of the disease to the other islands took form with the approval by the Governor of Rule and Regulation No. VII of the Division of Animal Industry on July 10, 1913.

Although no hogs have been shipped from Oahu since that time the disease has nevertheless made its appearance on Kauai in the Koloa district, from where the deputy Territorial veterinarian reports the death of a number of hogs including most of those belonging to the Koloa Sugar Company. He suggests that the disease was brought there with a couple of hogs shipped from Honolulu several weeks ago, but inquiry made at the freight office of the Inter-Island Steam Navigation Company shows that no hogs were shipped to Kauai since the month of May when six pigs were sent from the Waialae Ranch to Mr. Walter McBryde, from either of which places no disease has been reported. It would therefore seem likely that the outbreak on Kauai might be of the same nature as that on Oahu, that is a recrudescence or reinforcement of the attenuated virus, the continued presence of which cannot be doubted, even though the mild form the disease had attained made it fatal only to young pigs whose natural resistance had been impaired or weakened by other diseases or unfavorable surroundings and conditions, all tending to obscure the true nature of the disease. Rule IV of this Division, pertaining to the importation of hogs from the mainland of the United States, has proved effective in keeping out hog cholera ever since it went into effect several years ago, previous to which time the arrival of cholera hogs was of frequent occurrence; and so long

as the rule is enforced conscientiously there is little or no danger of fresh infection gaining an entrance here. It therefore remains to control the present outbreak with the means at hand, that is, segregation, disinfection and preventive or curative injections of hog cholera serum along the lines recommended by the Federal Bureau of Animal Industry.

A request from the deputy Territorial veterinarian of Kauai for the appointment of four quarantine guards by this Board for the purpose of preventing the spread of the disease beyond the Koloa district was referred to the committee on animal industry, which, at a meeting held on July 22nd, directed me to instruct him to deal with the outbreak along the lines indicated above, and calling his attention to the requirement of the regulations of this Board to the effect that all expenses in connection with the control and suppression of local outbreaks of infectious and contagious diseases must be borne by the owner, at least so far as the segregation, disinfection, destruction and disposal of diseased or dead animals are concerned, and that, if it is considered necessary to appoint guards, the same must be provided by the local health authorities or by the owners requiring them. The revised statutes of the Territory as supplemented by the regulations of the Board provide the necessary authority for effectively dealing with outbreaks of animal diseases, and the violation of an order to quarantine or segregate diseased animals carries with it consequences sufficiently severe to obviate the necessity of special quarantine guards so long as the outbreak is under the immediate supervision of an officer of this Board. It should, however, be borne in mind that this is the first time that the deputy on Kauai has had occasion to deal with an acute infectious disease of an epidemic nature, and that undoubtedly he was not aware of the authority vested in him when making the above mentioned request. So far as is known the disease has not made its appearance on any of the other islands to this date, and with the preventive measures taken for its suppression there is every reason to expect that further losses will be limited to scattered individual cases, or to herds where no effort is being made to protect the animals against it.

Control of Bovine Tuberculosis.

This work has been entirely in the hands of the assistant Territorial veterinarian in whose report the details of the same will be found. The testing of the dairy herds in the city of Honolulu, which has now been finished, while showing a comparatively small decrease in the number of affected animals, as compared to that recorded in the earlier tests, has nevertheless shown results which fully demonstrate the value of the work as well as the reliability of the methods employed. The complete eradication of the disease cannot be looked for until the more frequent

testing (four to six times annually) of the remaining infected herds is resorted to. The herds which were found clean the last two times they were tested will undoubtedly remain clean if care is taken to prevent their reinfection by the introduction of new animals, unless these come from other clean herds or else are kept segregated until they have passed two tests with an interval of four months. All herds, however, in which diseased animals (reactors) were found at this last test should now be retested every three or four months until they have passed three successive tests. As 60.4 per cent. of the dairy herds in the city have been found clean for the past two years there still remain 39.6 per cent. to be submitted to the frequent test method. As it must be obvious to every dairy owner that the sooner the disease is detected in an animal the less opportunity it will have to transmit the infection to the other animals in the same stable, it is not expected that any objection will be raised by the owners, especially as the present method causes little or no inconvenience to either owner or animals. The experience of other communities, notably the District of Columbia, has fully demonstrated that the disease cannot be completely eradicated if the annual test is adhered to, as it gives an infected animal, which has not yet had time to develop the disease sufficiently to react to the test, the better part of a year in which to become dangerous and a varying number of months during which it may excrete the virus before apprehended by the next test. It is therefore recommended that as soon as the testing of the herds in the county of Oahu, outside of Honolulu, has been finished, a retest be begun of those herds which were not found clean at the last test, to be followed by those which were not found clean at the last two tests.

Honolulu Quarantine Station.

I regret to have to report that on the night of July 15 (Sunday) a dog was stolen from the station. This animal, a cross between a Spitz and a Japanese spaniel, of no intrinsic value whatever, had arrived from San Francisco a couple of weeks previously and was expected to return to that place about the end of July. In fact the health certificate required by the California authorities had already been made out when, on the morning of the 16th, the keeper found the kennel empty though locked (bolted), the same as when he last attended the dog Sunday night. There was also plain evidence of a person having climbed over the woven wire fence to get in and of raising the same from the ground to pass the dog out under it. Further investigation showed that an automobile had come to the station on the Ala Moana road during the night, making a sharp turn outside the gate of the alley leading to the dog division and returning the way it came. The matter was immediately laid before the attorney general at whose request the local police authori-

ties undertook an investigation which, however, had led to no definite result at the time I left Honolulu for Hawaii. At the time of the theft there were a number of valuable dogs in the station, none of which were tampered with, demonstrating plainly that the removal of this particular dog, which could be of no value to anybody that did not know it, or were fond of it, must have been perpetrated by either the owner or somebody actuated to serve or harass the owner.

In the meantime steps have been taken to reinforce the fences, but it is obvious that the station, and especially the dog division, cannot be made burglar proof except at great expense, and then only by excluding the cooling breezes which are essential for the welfare, not to say the life, of the animals during their prolonged detention. Until the police department has reached some definite conclusion or located the missing dog it would seem advisable not to discuss the matter publicly, but I sincerely hope that the guilty person can be brought to justice and a precedent established that will be a warning to others who may feel inclined to disregard the quarantine regulations of the Board at any cost.

Trip to Hawaii.

Pursuant to verbal instructions from the President of the Board I left Honolulu on July 26 for the purpose of making a final examination of the horse stock in Waipio Valley and incidentally inspecting the new quarantine stations at Hilo and Kahului. I am pleased to report that the new Hilo quarantine station is well built and satisfactory in every essential respect. There is, however, much work to be done by the caretaker in road building and leveling, besides the filling in and flooring of the shelter sheds. Most of the material for this purpose is, however, on the ground and Dr. Elliot believes he has obtained a good steady man to do the work. I am further pleased to report that I have so far failed to find any indication of even a trace of the glanders infection remaining in Waipio valley. I have not alone examined all of Akaka's work animals, but have made diligent inquiries from many persons in the neighborhood, all of whom agree that there is no more disease among the horse stock in the valley, but that Akaka's animals are in better condition and better taken care of than has been the case for years. His stables are also in good condition. I leave for Maui tomorrow, where, with the Board's permission, I should like to remain a few days with Dr. Fitzgerald. If necessary that I should return at once a message addressed in his care will reach me without fail. I have, however, benefited so much already by this trip that I hope that I can be spared for a few days more.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT.

Honolulu, July 31, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,
Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith my report for the month of July.

Tuberculosis Control.

During the past month 953 head of cattle have been tested, of which number 915 have passed and 38 been condemned and branded. The following is a tabulated list of the different dairies visited with the number of cattle tested, condemned or passed in each:

| | T. | P. | C. |
|------------------------------------|-----|-----|----|
| June 30-July 5—Chas. Bellina..... | 230 | 208 | 22 |
| June 30-July 5—M. M. Pedro..... | 14 | 14 | 0 |
| July 2- 5—Frank Andrade | 94 | 94 | 0 |
| July 7-10—S. M. Damon..... | 148 | 145 | 3 |
| July 7-10—Frank Correa | 13 | 13 | 0 |
| July 7-10—W. P. Louis..... | 14 | 14 | 0 |
| July 7-10—Kamehameha Schools | 40 | 39 | 1 |
| July 8-11—S. M. Damon..... | 195 | 192 | 3 |
| July 9-12—M. Kawamura | 5 | 5 | 0 |
| July 9-12—M. Quintal | 5 | 5 | 0 |
| July 9-12—Joe Fernandez | 8 | 8 | 0 |
| July 9-12—S. Teumoto | 10 | 10 | 0 |
| July 8-12—G. L. P. Robinson..... | 6 | 6 | 0 |
| July 9-12—Frank Vaeph | 5 | 5 | 0 |
| July 14-17—M. Riedell | 8 | 8 | 0 |
| July 14-17—Desidero Fello | 2 | 2 | 0 |
| July 14-17—J. P. Mendonca..... | 14 | 14 | 0 |
| July 14-17—Alexander Young | 59 | 55 | 4 |
| July 14-17—C. J. Day..... | 3 | 3 | 0 |
| July 14-17—Geo. Holt | 38 | 34 | 4 |
| July 14-17—Geo. Wond | 33 | 33 | 0 |
| July 15-18—Y. Nakamura | 4 | 4 | 0 |
| July 15-18—S. Boyama | 9 | 9 | 0 |
| July 15-18—I. Morioko | 16 | 15 | 1 |

Attention is drawn especially to the four cows condemned on this test in the Alexander Young dairy. On the first general test of dairy stock in the city and county of Honolulu four years ago, this herd was given the subcutaneous test by Dr. W. T. Monsarrat, who condemned 26 head out of a total of 37 animals submitted to the test. Subsequent post mortem examinations of the condemned ones showed them to be extensively affected with

tuberculosis, many of them being condemned entire as unfit for food.

Considering the large amount of tuberculosis present in the herd the remaining eleven animals were naturally regarded with suspicion, as there was little chance of their escaping the infection and one or two reactions were expected during the next two or three years, the time depending of course on the progress of the disease in the animal system. The second and third tests passed without showing any reactions among these eleven cows, which is surprising when it was almost certain that some of them were infected. Owing to the excellent care and treatment which these animals received their vitality was of such a high degree that they were able to hold the disease in check. On this, the fourth test, however, two of these cows gave unmistakable reactions along with an imported cow and a heifer which had been raised in the place. Careful post mortem examinations were performed on all these animals, the results of which are as follows:

No. 1.—3-year-old heifer raised on the place from imported California stock. Reaction: Large and typical in character. Lesions: Small, recent nodules in the retro-pharyngeal and broncho-oesophageal lymph glands.

No. 2.—Imported short horn cow: had passed subcutaneous test on the coast and one intradermal test here a year ago. Reaction: Small in size but showing all the typical characteristics. Lesions: Small nodules in portal lymph glands and large abscesses the size of the closed hand in the liver. The carcass was in prime condition.

No. 3.—Grade Hereford cow. Had been in the dairy for some years and had passed three tuberculin tests, the first of which was the classical subcutaneous method. Reaction: Medium size and of a typical character. Lesions: A careful examination failed to reveal any tuberculous lesions in the usual seats of the disease. Although I made a most careful examination in this case and was unable to find any evidence of disease it is more probable that I overlooked it than that it was not there. This is the first case out of thirty-five post mortems in which I have failed to locate the disease.

No. 4.—Grade Holstein cow. Like the above animal it had been in the dairy for a number of years and had passed through the same three tests. Reaction: Large and of a diffuse character, the injected fold being at least four times as thick as the opposite one. Reactions of this character although positive indication of the presence of tuberculosis, are comparatively rare. Lesions: Left retro-pharyngeal lymph gland contained six well encapsulated nodules all nearly alike in size being nearly the diameter of a dime. The connective capsule around each was very prominent and completely circumscribed it. These gave every evidence of being in a quiescent stage and had they been the only

lesion in the animal system the cow would in all probability have shown no reaction. The diaphragmatic lobe of the right lung contained a mass of tuberculous tissue six to eight inches in diameter, containing a cheesy semi-calcified material in the center; this was surrounded by numerous nodules varying in size from a dime to half a dollar, all of which indicated renewed activity of the disease at this point.

There is still one cow in the dairy, also one of the eleven remaining from the first test, which, although it showed no reaction, not even the slightest swelling at the point of inoculation, presented to palpation a greatly enlarged retro-pharyngeal lymph gland which is undoubtedly of a tuberculous nature, but which is so completely sequestered as to be beyond detection by any tuberculin test. Such an animal while not an immediate danger is an unsafe proposition, and the owner was advised to dispose of it at the earliest moment.

In connection with the testing of dairy stock and the improvement of the sanitary conditions under which milk is being produced, I bring attention to a clause in Section 11 of the city and county milk ordinance which provides for the issuing to each dairy owner upon application a permit to sell or otherwise dispose of milk. The clause above referred to reads as follows:

"He shall within four months after the filing of such application furnish a certificate from a veterinary surgeon showing that all such cows are free from tuberculosis. The Board of Supervisors shall provide for the testing of cows and the furnishing of such certificate without charge to the applicant."

In order to aid the Board of Supervisors to intelligently carry out the provisions of Section 11 of the milk ordinance and to enable them to revoke any and all permits where the applicants have not within the required period of four months furnished the above referred to certificate of health from a veterinary surgeon, it is hereby recommended that the Board of Agriculture and Forestry through its Division of Animal Industry issue direct to the Board of Supervisors such a certificate of health upon the completion of the tuberculin test in each dairy. The following blank form of certificate is recommended:

CERTIFICATE OF HEALTH.

Name
 Location of dairy
 Number of cows tested
 Number of cows passed
 Number of cows condemned
 Disposition of reactors

Remarks on hygienic conditions.....

Date.....

.....
Territorial Veterinarian.

The above form is concise and gives all the information required from the Division of Animal Industry in the issuing of a permit to sell milk. Detailed information on the hygienic methods in use in individual dairies should be obtainable from the files of the city and county milk inspector. The addition to the herd of untested cows should appear in the daily report of the milk inspector and the Territorial veterinarian at once notified of the presence of such animals so that they can be tested.

Importations at the port of Honolulu for the month of July:

July 1—S. S. Lurline, San Francisco: G. T. Weinberg, 13 horses, 2 mules; Various, 22 crates poultry; U. S. Lep. Exp. Station, 5 crates hares, 2 crates monkeys; W. F. Pogue, 4 crates poultry; Maui Agricultural Co., 2 crates poultry.

July 2—S. S. Mongolia, Orient: Benj. Megic, 2 Japanese spaniels.

July 7—S. S. Ventura, San Francisco: Various, 5 crates poultry.

July 8—S. S. Wilhelmina, San Francisco: Mrs. M. Howe, 1 dog; Hind, Rolph Co., 1 crate pigeons; Various, 21 crates poultry.

July 15—S. S. Honolulan, San Francisco: Schumann Carriage Co., 26 mules; Capt. W. C. Short, 2 horses, 2 dogs; Various, 16 crates poultry.

July 21—S. S. Sierra, San Francisco: Mr. Church, 1 Boston bull dog; Various, 21 crates poultry.

July 29—S. S. Lurline, San Francisco: Alexander & Baldwin, 43 mules; J. R. Banning, 4 horses; Quartermaster Department, 4 horses; Various, 19 crates poultry.

Respectfully submitted,

L. N. CASE,

Assistant Territorial Veterinarian.

REPORT FOR AUGUST.

Honolulu, Sept. 3, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of August, 1913, as follows:

Worm Disease on Maui.

On my return from Waipio valley, Hawaii, I stopped on Maui to inspect the new animal quarantine station at Kahului and to get a first hand idea about live stock conditions on that island with special reference to bovine tuberculosis. That my visit proved timely will be seen from the following: In a certain district (around Spreckelsville) a considerable number of mules have recently died, nearly all showing symptoms more or less identical with those generally accepted as characteristic of cerebro-spinal meningitis. In one large plantation stable alone nearly thirty head have died in the course of eight to nine weeks, the course of the disease lasting from less than one hour to several days, but rarely exceeding one week, except in the few cases where recovery ensues. The animals may become affected either while in the stable or while at work in the field. In the latter case there is but slight hope of recovery, the principal symptoms being extreme difficulty of respiration, the animal seeming to suffocate, with staring eyes, open mouth and more or less profuse hemorrhage from the nostrils. These attacks appear principally on sultry days, the animal breaking out in profuse perspiration, sometimes showing considerable bloating of the abdomen, and soon falling down in the harness and dying in extreme agony. When taken in the stable the symptoms are less severe and more like those of mouldy feed poisoning or spinal meningitis.

At the urgent request of Dr. Fitzgerald, who was at his wits' end, his losses on one plantation aggregating more in two months than in the preceding two years, I stayed with him in hopes of seeing one or more fresh cases and especially in hopes of examining one or more after death. In the meantime every condition pertaining to live stock sanitation and hygiene was carefully gone into, and while several milder cases were seen it was not until I was ready to return to Honolulu that a typical fatal case occurred. The day was extremely hot and sultry and the animal in question was hitched to a cultivator when the driver noticed that it had broken out in profuse sweat. Before long it stopped short, the head stretched out straight with eyes popping out and the mouth wide open, and in a few minutes fell to the ground with blood running from both nostrils and death resulting in short order. An hour later when I reached the place the carcass was considerably swollen, the luna in charge being of the opinion that at least some of the swelling was present before the mule died.

A careful postmortem examination showed extreme infestation of the large body arteries with the armed wire worm or palisade worm (*strongylus armatus*), some of the aneurisms on the posterior aorta being the size of a hen's egg and filled with a more or less organized blood clot from which protruded the

wriggling bodies of the worms. These were also seen half buried in the inner lining of the adjoining blood vessels, producing conditions strongly resembling the mucous membrane of an intestine affected with typhoid ulcerations. As none of the intestines were swollen or discolored from embolism there can be little doubt that the violent symptoms and sudden death must be due to lesions anteriorly to the diaphragm. The lungs were distended with blood and of dark purple color, confirming the diagnosis of suffocation, but an actual rupture of pulmonary blood vessels could not be found though the larger bronchi and the trachea were filled with frothy blood. This again would indicate that the actual site of the cause must be sought in the brain and undoubtedly in the form of paralysis of the respiratory center, resulting from either chemical substances, toxins, or, considering the already described conditions of the abdominal arteries, as the result of embolism, that is, the wedging of a minute blood clot, torn by the blood stream from the large clots in the abdominal vessels and carried with the circulation to the brain, where according to the location, pressure by the obstructed blood stream behind the embolus, various symptoms will be produced, as for instance, paralysis of the respiratory center. As there are 18 ways—nine on either side—by which such a clot (embolus) may enter the brain it is easily understood that it may become lodged or wedged in almost any part of the brain, and that consequently the resulting symptoms may manifest themselves in any part or organ of the body, exactly as is observed in this mysterious disease, generally called cerebro-spinal meningitis. Sometimes the entire hind part is paralyzed, sometimes only the throat, or the tongue, or the muscles of deglutition (swallowing), or the optic nerve (blind staggers) or as already stated—the center of respiration is affected, and the animal suffocates as effectively as had it been strangled.

I have to state that this theory—that spinal meningitis may be due to nothing but eggs, embryos or the blood clots produced by this same wire worm, circulating in the blood until arrested in the brain—is not original with me, but has been recently advanced by one of the scientists who studied this disease on the spot when more than 30,000 head died in the course of two months in Kansas and Nebraska a year and a half ago. It is, however, only my observations on Maui, and especially the post-mortem examination above referred to, that has convinced me of the plausibility of the theory, especially as it opens up a possibility of combating this most mysterious of all equine scourges, and the one which at the present time is causing greater loss in these Islands than all others combined. But unfortunately the life history of the worm in question has not been fully worked out, even though we know that in all probability the drinking water is the principal carrier and distributor of the parasite. As the Board

will know from my previous reports I have long been of this opinion, and have before observed gratifying results when it was possible to filter the drinking water or at least exclude from consumption streams, pools and ditches known to carry the infection. I have therefore gone to work on this theory and am endeavoring to solve the question of providing filtered or at least uncontaminated drinking water for the work animals not alone when at home in their respective stables but also while at work in the fields. This requires the filtering of large quantities of water, which often carries a great deal of suspended soil, and besides, the transportation or piping of such purified water to frequently distant fields in sufficient quantities to provide from 3 to 5 gallons for each animal when fed at noon. Whether the artesian water obtainable in many places is free from the infection has to be determined, and the constant reinfection of rest pastures (Sunday pastures), and streams leading to or through them must be controlled. The destruction of the parasites within the animal organism, medicinally, is at present despaired of, but may be accomplished by antitoxin or serum treatment since it has already been demonstrated that the injurious effect of some intestinal parasites—tape worms for instance—is due to poisonous products excreted by them, and not to mechanical or nutritive injuries. And finally the eradication of the parasite from the Territory must be attempted along the same lines as with other diseases, first and principally by limiting the supply constantly brought in with imported animals, from without. I have, in company with Dr. Elliot, made postmortem examination of a mule that died in quarantine a few days after arrival and which was fully as badly infested with the armed wire worm as any I have seen here.

In conclusion, if this surmise in regard to the identity of cerebro-spinal meningitis, feed and mould poisoning and the equally fatal colic is substantiated, and the theory is supported by some of the leading worm scientists of the country then there is every reason for an unrelenting campaign against the parasite in question, and I trust to be able to report progress along the lines indicated in my future reports.

Kahului Quarantine Station.

Though of small size as compared to the Honolulu and Hilo stations I feel sure that any single importation to Maui can be accommodated within it. The arrangement of paddocks, stalls and chutes is almost ideal, and when a number of the trees which now stand in the paddocks have been removed it will be difficult for any importer to find anything to criticize. The water supply is abundant and convenient, and an isolation paddock for suspicious cases of infectious diseases fills a long felt want.

Dr. Fitzgerald has already done a considerable amount of test-

ing for bovine tuberculosis, and all reactors have been destroyed under his supervision. This work will be pushed by him so far as he is able to do it without financial aid from either Territory or county, but in a conference with some of the members of the Maui Board of Supervisors I was given to understand that the question of promulgating a milk ordinance has not been dropped but will receive attention in the near future.

Rabies and Dog Quarantine.

The daily papers from the mainland as well as veterinary and other scientific periodicals continue to report outbreaks of rabies in increasing numbers, while the Pasteur institutes for the treatment of bitten persons testify to the numbers that constantly present themselves for preventive injections. Even the veterinary profession has begun the treatment of pets or valuable dogs which have been bitten or exposed to the infection where mad dogs are known to have been abroad.

In this connection I have to report that the dog which so mysteriously disappeared from the quarantine station on July 13 has been returned by the owner who claims that he accidentally found it in a house on King street, where it is said to have been ever since it disappeared. The dog is fortunately sound so far as can be seen. The question of further action in the matter is respectfully submitted for the Board's decision.

In the meantime the dog division has been reinforced so far as possible, the inside fence with three strands of barb wire, while a kiawe hedge will be planted along the outside fence, and the paddocks provided with padlocks and chains. The only further precaution which could be taken would be to have a keeper sleep within the enclosure, which, if decided upon, will require the building of a cottage for his use.

Tuberculosis Control Work.

This work has been reported on in the appended report by Dr. Case and should be considered in connection with my remarks on the subject in last month's report. I have under consideration a change in the present regulations, requiring that all dairy stock intended for importation to the Territory must come from herds known to be free from tuberculosis. Some very valuable cattle have been imported here, passing the test successfully both before and after arrival, only to be found reacting when tested again, six months to a year after arrival, showing that they must have been infected at the time they were tested for shipment, but not sufficiently to cause a reaction. In every case these animals came from infected herds, and in one case at least there is no possibility of infection having taken place after arrival here, the owner having had a clean herd for the past three or four

years. I am now corresponding with the live stock sanitary authorities in various States on the Coast to see what can be done to protect the local importers, and will report further on the subject. In the meantime it will be seen that bovine tuberculosis is steadily though slowly on the decrease, but it is hoped that no objections to the plan suggested in my last report will be met with on the part of the owners and that we may before very long be entirely rid of the disease in the city and county of Honolulu.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT.

Honolulu, Sept. 5, 1913.

Dr. V. A. Nörsgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of August, 1913:

Tuberculosis Control.

The animals in the following dairies have received the tuberculin test:

| | T. | P. | C. |
|--|-----|-----|----|
| August 8-11—The Rose Davison Dairy.... | 4 | 4 | 0 |
| August 16-19—Vincent Bowen | 3 | 3 | 0 |
| August 18-21—P. M. Pond, Mokuleia..... | 105 | 101 | 4 |
| August 19-22—R. Compos | 4 | 2 | 2 |
| August 19-22—Lunalilo Home | 15 | 15 | 0 |

The above practically finishes testing the city dairies. The total number of animals so far tested in these dairies is 2103, of which number 88 have been condemned, or 4.18 per cent. There still remains to be tested the range herds on the different ranches from which many dairies are supplied with milk cows, and which will amount to about four thousand head. This work cannot be undertaken until the annual drive has been finished, the lack of feed having compelled several ranch managers to postpone the segregation and branding as well as the testing, until conditions are more favorable.

Importations.

The following livestock arrived here during the past month:

August 4—S. S. Sonoma, from San Francisco: 2 dogs, 1 box rabbits, 1 crate poultry, R. H. Campbell; 10 crates poultry, N. B. Lansing.

August 5—S. S. Wilhelmina, from San Francisco: 1 dog, W. O. Pearce; 1 crate poultry, W. F. Exp. Company; 1 crate poultry, H. May & Co.; 9 crates poultry, N. B. Lansing; 1 crate poultry, Schuman Carriage Co.

August 7—S. S. Hilonian, from Seattle: 1 dog, R. H. Campbell; 67 mules, 15 horses, Quartermaster's Dept., U. S. A.

August 12—S. S. Honolulan, from San Francisco: 17 mules, Club Stables; 23 mules, Schuman Carriage Co.; 1 dog, Mrs. P. H. McKaigae; 1 crate poultry, E. O. Hall & Son; 1 crate poultry, F. L. Hoogs; 18 crates poultry, 1 crate ducks, N. B. Lansing; 2 crates poultry, Mrs. S. B. McKenzie, Hilo; 57 head cattle, Hind, Rolph & Co.

The distribution of the above 57 head of cattle was as follows: H. M. von Holt, 6 short horn bulls, 6 Hereford bulls; Kamehameha Schools, 5 Holstein heifers; Umikoa Ranch, 4 Hereford bulls, 1 Holstein bull; W. H. Shipman, Hawaii, 8 Hereford bulls, 2 Angus bulls, 1 Holstein bull, 2 Holstein heifers; A. W. Carter, 1 Holstein heifer; Puuwaawaa Ranch, 2 Angus bulls, 6 Hereford bulls, 1 Holstein bull, 4 Holstein heifers; Mrs. E. C. Greenwell, 1 Angus bull, 2 Hereford bulls, 1 Holstein bull; J. A. Maguire, 1 Holstein bull.

August 18—S. S. Sierra, from San Francisco: 4 crates poultry, August Carrier; 6 crates poultry, A. Lambert; 6 crates poultry, J. Sly; 8 crates poultry, Sing & Sing Company; 2 crates poultry, M. Vasconcellas; 24 crates poultry, N. B. Lansing.

August 26—S. S. Lurline, from San Francisco: 3 horses, 16 mules, Club Stables; 1 mare, 1 colt, A. W. Carter; 1 crate poultry, E. L. Marshall; 3 crates poultry, J. Doyle; 6 crates poultry, A. Lambert; 9 crates poultry, N. B. Lansing; 1 dog, W. F. Ex. Co. (E. Field, Wahiawa); 1 parrot, Ivan Johnson; 1 horse, M. Vasconcellas (crippled).

The above horse was suffering from fracture and dislocation of the pelvis when shipped from San Francisco. This condition was due to an accident received some time before shipment. The voyage to Honolulu no doubt greatly aggravated the injuries and the animal was in such shape when landed here that the consignee refused to accept delivery of it. The horse is now at the quarantine station pending negotiations between carrier and shipper.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

A toy company at Sheboygan, Wis., started out to use only the waste wood from other mills. It has worked out a system of using all small waste pieces so that practically nothing but the sawdust is lost.

DIVISION OF ENTOMOLOGY.

Honolulu, July 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of July as follows:

During the month 43 vessels arrived at the port of Honolulu, of which 22 carried vegetable matter and one vessel moulding sand.

| <i>Disposal</i> | <i>Lots</i> | <i>Parcels</i> |
|--------------------------------|-------------|----------------|
| Passed as free from pests..... | 1025 | 18,392 |
| Fumigated | 17 | 575 |
| Burned | 43 | 135 |
| Returned | 2 | 61 |
| Total inspected | 1087 | 19,163 |

Of these shipments 18,975 packages arrived as freight, 124 packages in the baggage of passengers and 64 packages in the mail.

Rice.

During the month 27,280 bags of rice arrived from Japan and 2600 bags were found infested with live weevils, and the larvae of the rice moth (*Paralipsa modesta*). Arrangements were immediately made with the consignees to fumigate the whole shipment and as we are without adequate large room for such work we used our small room capable of holding 200 bags and used our large double oiled tarpaulin which covered 125 bags. A double dose of hydrocyanic acid gas was used with good results and the rice was immediately taken to the mill for cleaning. All the bags were marked fumigated at Kobe and the owners, Alexander & Baldwin, had certificates stating that the rice had been fumigated at Kobe. Nevertheless the whole shipment was infested and this condition can be explained thus: Either not all of the rice was fumigated and the infested bags reinfested the rest of the shipment, or the rice was loaded on top of some infested rice shipment going to San Francisco and became infested through it. I have written to the California State commissioner of horticulture asking him to take some action in regard to rice shipments and called his attention to the various pests found on rice shipments. Meanwhile we are getting matters well planned to erect a large fumigatory near the waterfront just for such emergencies as we had this month.

Pests Intercepted.

Fifteen packages of fruit and 25 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. These were all seized and destroyed by burning.

One hundred and two boxes of apples and 6 boxes of pears came from the Coast, which were badly infested with the codlin moth. Of these 62 boxes of apples and 6 boxes of pears were put back on the Ventura going to Sydney with the request that they be dumped at sea, and 60 boxes were returned to the Coast on the Lurline, which left the same day that fruit arrived. I notified the shipper regarding these shipments and sent him copies of our rules and regulations relating thereto.

The U. S. Experiment Station received a box of Manila hemp roots (*Musa textil*) which were found badly infested by a borer closely allied to the cane and banana borer. The shipment was destroyed by burning. The same package also contained a nest of ants (*Prenolepsis bourbonica*).

In the mail was found a package of seed corn infested with the Angoumois grainmoth (*Sitotroga cerealella*). The package was fumigated before delivery. Two packages of beneficial insects arrived for the H. S. P. Association and were opened in my presence. One lot contained besides ophis parasites a quantity of larvae and eggmasses of an Asilid fly, a special report on which I submitted to the Board during this month.

Queenbees.

Two queenbees arrived in the mails and after examination, having a satisfactory certificate, they were allowed to be delivered.

Hilo Inspection.

Brother M. Newell reports the arrival of seven steamers and one sailing vessel, of which six steamers carried vegetable matter consisting of 119 lots and 2082 parcels, all of which was found free from pests and was passed. During the month the Anyo Maru visited Hilo direct from Japan and Mr. D. B. Kuhns was delegated to be on hand at Hilo during the unloading of said vessel and to go over the cargo with Brother Newell. There were 6100 sacks of rice and 605 bags of beans landed at Hilo, all of which was found free from pests and was passed. One shipment of plants was on board but was not allowed to land on account of Federal as well as Territorial regulations.

Inter-Island Inspection.

During the month of July 69 steamers were attended to and the following shipments were passed:

| | |
|---------------------|--------------|
| Plants | 807 packages |
| Taro | 684 bags |
| Fruit | 7 packages |
| Lily root | 9 packages |

Total passed 1507 packages

The following packages were refused shipment:

| | |
|------------------|-------------|
| Fruit | 10 packages |
| Plants | 11 packages |

Total 21 packages

These were refused shipment on account of infestation and soil attached.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

REPORT FOR AUGUST.

Honolulu, August 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of August as follows:

During the month 40 vessels arrived at the port of Honolulu, of which 23 carried vegetable matter and one vessel moulding sand:

| <i>Disposal</i> | <i>Lots</i> | <i>Parcels</i> |
|-------------------------------------|-------------|----------------|
| Passed as free from pests | 911 | 21,827 |
| Fumigated | 4 | 13 |
| Burned | 34 | 43 |
| <hr/> | | <hr/> |
| Total inspected | 949 | 21,883 |

Of these shipments 21,827 packages arrived as freight, 43 packages by mail and 82 packages as baggage of passengers.

Rice.

During the month 22,386 bags of rice arrived from Japan which, after close inspection, was found to be free from pests and was passed for delivery.

Pests Intercepted.

Seventeen packages of fruit and 13 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were all seized and destroyed by burn-

ing. One package of chestnuts was taken from a passenger which was found badly infested with a chestnut weevil (*Balaninus species*). Several packages of pears infested with codlin moth were seized and destroyed. A package of medicinal herbs from Japan in the mail was badly infested with *Lepidopterous* larvae and the material burned. In a box containing violet plants from California was found a nest of the small black honey ant (*Prenolepis imparis*). After fumigation the plants were repacked in clean moss and the old material burned.

Three packages of sugar-cane from Argentina arrived by parcel post for the director of the H. S. P. A., and he gladly turned these over to me and they were burned. The sending was unsolicited by the station.

One package of soil from Singapore arrived by freight and the consignee gladly turned it over to us to destroy by burning.

On the return of the *Luka* from Palmyra Island, the inspectors found two land-crabs on board and as these are prohibited under regulations of the Board they were killed. These crabs are very destructive, not only to coconuts but also to all kinds of vegetables, and it is fortunate that the species does not exist in Hawaii despite the fact that they are considered a delicacy even surpassing the lobster in taste.

Queenbees.

Six queenbees arrived in the mail and after examination, the packages bearing a certificate by the State inspector, they were permitted entry.

Hilo Inspection.

Brother M. Newell reports the arrival of six steamers and two sailing vessels. The six steamers carried vegetable matter consisting of 214 lots and 3365 packages. Of these 10 boxes of pears were badly infested with codling moth and were dumped at sea.

Beneficial Insects.

During the month 28 lots of Japanese beetle fungus were furnished applicants on Oahu and 1 box sent to an applicant at Hilo. The beetle has been unusually abundant, destroying many plants in well kept places. One colony of fig wasps was sent to Kohala, Hawaii. The colony was secured from Moanalua where this wasp was successfully introduced several years ago and where it can always be found in the Capri figs.

Inter-Island Inspection.

During the month of August 57 steamers were attended to and the following shipments were passed:

| | |
|------------------|--------------|
| Plants | 856 packages |
| Fruits | 12 packages |
| Taro | 700 packages |

Total passed 1568 packages

The following packages were refused shipment:

| | |
|------------------|-------------|
| Fruit | 9 packages |
| Plants | 28 packages |

Total 37 packages

These were refused shipment on account of infestation and soil attached.

During the month I visited Hilo for the purpose of going over the work with the local inspector, Brother Newell, and also for the purpose of looking into existing conditions for the future welfare of the horticultural quarantine work. Brother Newell and I visited every available warehouse to ascertain whether or not any of them could be used for fumigating the rice shipments which are now being shipped to Hilo, direct, from Japan. One of these could be used by lining the lower portions and floor with heavy building paper. We also visited the new rice mill which is located in a very convenient place so that all the rice which is consigned only to this mill could be hauled directly to the mill from the landing and cleaned as fast as hauled; and in this way infested rice, should any arrive, would not become a menace. However, if infested rice is stored for a time all pests infesting same have a chance to escape. Especially is this true if rice goes through a sweating. The milling of uncleaned rice does much toward eliminating rice pests if the rice is handled immediately upon arrival.

I also had an opportunity while at Hilo to be present at the arrival of a large shipment of fruit from the Coast by the steamer Enterprise. I watched the inspection of these shipments very closely and I am pleased to say that it is done in a very thorough manner.

While on Hawaii the president of the Board of Agriculture and Forestry requested me to accompany him through Puna, Kau and Kona districts to aid him in the distribution of parasites of the Mediterranean fruitfly and the hornfly, it being rather difficult for one man to handle large quantities of these perishable insects. I was glad of the opportunity to visit these localities as it gave me a chance to study in a limited way some of the pests which people often complain about. Wherever I could, I also made investigations of ferneries to ascertain whether the fern weevil (*Syagrus fulvitarisus*) had made its appearance in these districts;

and I am pleased to report that my observations failed to reveal any evidence of the presence of the fern pest, nor could anyone report having observed any injury to their ferns.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, July 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for July, 1913:

During the first fortnight of the month I was in Honolulu engaged with routine work, in part pertaining to the closing of the former fiscal period and with getting under way forest projects under the new financial allotment. A brief report of the work of the Division of Forestry for the past fiscal year was prepared and sent to the Governor to be included in his annual report.

Forest Planting on Tantalus.

Pursuant to directions of the Board, a plan was worked out early in the month, on the ground, for the replanting with native Hawaiian trees, koa and kukui, of the slopes of Sugar Loaf, at the head of the side valley running up from Makiki, below Round Top. Koa seedlings already in the nursery will be set out as soon as there is favorable weather for planting. In the meantime work has been started on a service trail across the slope. The upper slopes will be planted with koa; lower down in the valley kukui will be used. A supply of kukui seedlings is now being got ready.

Inspection Trip—Bishop Estate Land, Kaeoailoa.

On July 10, in company with Mr. G. H. Gere, I made an inspection of certain wood cutting operations on a tract of Bishop Estate land at Kaeoailoa, Oahu, which I followed by a letter of recommendations to the trustees. Visits of this character form a regular part of the duty of the Division of Forestry. Upon request advice upon any sort of forest work will be furnished any owner of forest land, the only proviso being that the applicant pay the traveling expenses of the agent sent.

Visit to Island of Maui.

From July 16 to August 2, I was on the Island of Maui looking generally into forest reserve matters, but with particular reference to forest reserve boundaries. I made a complete circuit of West Maui, seeing the forest line above Honolua, Lahaina, Olowalu, Wailuku and Kahakuloa; traversed the Koolau forest reserve along the East Maui ditch system, looking especially into the tree planting work that has been going on there under the general direction of this office; visited various points on the forest reserve line above Nahiku and Hana, to see where and how much fencing of that boundary was required; and checked up on the condition of a portion of the fence enclosing the Makawao forest reserve that I had not seen for some time. My findings from this trip will shortly be presented to the Board as a special report. Incidentally I had while on Maui a number of conferences about forestry matters with the people interested, when various details were talked over and arranged.

Above Wailuku I had the pleasure of visiting the areas at the base of the steep ridges, above the cane fields, that have been planted with trees by the Wailuku Sugar Company during the past four years. These plantations are making a really remarkable growth considering their location on exposed ridges. Within a short time now the trees will have reached a size sufficient to be easily seen from the main road. The purpose of the planting is to put to use land that would otherwise be waste area and to prevent further erosion. Several species of eucalypts have been used, with ironwood and silk oak, and, beyond Waikapu, algaroba.

Forest Nurseryman's Report.

As usual the report of the forest nurseryman is transmitted herewith. One point not noted therein was a visit to Fort Kamehameha, where suggestions were made to the commanding officer in regard to the planting of trees and ornamental shrubs. Some plant material has already been furnished for use at this post. Later it is expected that a more detailed plan will be worked out, with which this Division will assist.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF NURSERYMAN.

Honolulu, July 31, 1913.

Mr. R. S. Hosmer, Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of July:

Nursery.

Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot Grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold . . . . . | .... | .... | 338 | 338 |
| Gratis | 1000 | .... | 584 | 1584 |
| | <hr/> 1000 | <hr/> | <hr/> 922 | <hr/> 1922 |

Collections.

| | |
|--|---------------|
| Collections on account of plants sold amounted to..... | \$ 7.45 |
| Rent of building, nursery grounds, for month of June.... | 35.00 |
| Total | <hr/> \$42.45 |

The forestry cottage on Tantalus has been overhauled and put in good repair.

Experiment Garden, Makiki.

The assistance of one of the men was required in the repairing of buildings, etc., and about two weeks have been spent on this work, other work done being the regular routine work.

Honolulu Watershed Planting.

A commencement was made on July 14 to make arrangements for the planting of part of Sugar Loaf and the adjoining valleys. Two men have been at work making trails and collecting kukui seed and plants. The planting of koa on the higher and exposed places and of kukui along the bottoms and lower sides of the slopes is the plan agreed to be followed. We have at the Makiki Station about 1000 pot grown koa trees ready to set out and we are propagating more from seed. The kukui we are propagating from seed and also picking up a number of sprouted plants from under the trees. Those will be potted off and allowed to grow until they are good, strong plants before setting out.

Plantation Companies and Other Corporations.

The distribution of plants during the month amounted to 12,000 in seed boxes, 2600 in transplant boxes and 400 pot grown. Total 15,000. Orders have been received for 6000 in transplant boxes and 40,000 in seed boxes to be delivered during the next four months.

U. S. Experimental Planting, Nuuanu Valley.

The man has been doing the regular routine work transplanting and attending to the trees that have been planted out.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

REPORT FOR AUGUST.

Honolulu, August 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to submit as follows the routine report of the Division of Forestry for August, 1913.

Returning on August 2 from a field trip to Maui that covered several weeks in July, my own time this past month has been largely spent in the office in attention to various matters of detail in connection with forest fencing projects now pending before the Board, and with the preparation for submission to the Board of several reports upon forest reserve matters.

Inspection Trips.

During the month I have made several short trips to points in the vicinity of Honolulu to look into questions in regard to the proposed Honolulu watershed reserve, and one to Waianae, to discuss on the ground with the manager of the Waianae Company the methods to be used in thinning a stand of algaroba trees on a tract of government land for which that company has recently secured a license to gather the beans.

For some little time certain of the trees along the Pali road, in the plantations started in former years by this Division, have been badly in need of pruning and thinning. About the middle of the month I went over the road with Mr. Haughs, and indicated where trees should be pruned and openings for vistas made. A gang of Territorial prisoners furnished by High Sheriff Henry is now engaged, under Mr. Haughs' supervision, in carrying out this work. The essential purpose is by the removal of the lower branches to give an unobstructed view along the road, especially at curves, and also to open up vistas toward the mountains or the sea, where the growth along the roadside has become so dense as to cut off the view.

During the month substantial progress has been made in the preliminary steps leading to the planting of the open area on Tantalus, on the slopes of Sugar Loaf. As is usual every month, numerous requests for advice about tree planting and for plant material have been received and given attention. I transmit herewith the report of the forest nurseryman which outlines this side of the forest work more in detail.

Forest Fires.

Forest fires were reported during August as follows:

By Mr. C. C. Conradt, Pukoo, Molokai. A fire on July 23 that burned over about 100 acres of grass and brush land near Wai-alua, Molokai.

By Mr. Gaylord P. Wilcox, Kealia, Kauai. A fire that escaped from a homesteader at Waipouli and burned over between 200 and 300 acres of grass land and into a grove of koa and kukui on the Nouou ridge, Kawaihau, August 8, 1913.

By Mr. W. M. Templeton, Wahiawa, Oahu. Two fires on the military reservation above the Wahiawa colony, on the land of Waianae-uka, one of which endangered to some extent the forest on the Territorial forest land of Wahiawa.

These last fires were put out by troops sent from Schofield Barracks upon request of Mr. Templeton. That at Waipouli by a gang of laborers got together by Mr. Wilcox. The Molokai fire was extinguished by a shower following a fortunate turn of the wind.

Action in regard to fixing the responsibility for the fires on Molokai and Kauai is now pending before the Board.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF NURSERYMAN.

Honolulu, August 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The report for the month of August is as follows:

Nursery.

Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot Grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold | 3000 | 50 | 191 | 3241 |
| Gratis . . . . . | .... | 200 | 787 | 987 |
| | <hr/> 3000 | <hr/> 250 | <hr/> 978 | <hr/> 4228 |

Collections.

| | |
|---|---------------|
| Collections on account of plants sold amounted to | \$ 6.90 |
| Collections on account of seed sold amounted to | .50 |
| Rent of building, nursery grounds | 35.00 |
| Sale of box shooks | 8.25 |
| Reimbursement for ½ of postage on book entitled "Indigenous Trees of Hawaii" (Rock) according to agreement with College of Hawaii | 3.25 |
| Total | <hr/> \$53.90 |

Plantation Companies and Other Corporations.

The distribution of trees under this heading amounted to 10,000 seedlings.

Seed Collecting.

We have been trying for the past month to collect koa seed, and the different valleys and groves from Palolo to Kalihi have been searched. Llewellyn Dowsett, with the aid of a man kindly granted by Mr. Meyer of the Waianae plantation, has explored the Waianae and Nanakuli gulches with the result of finding only a few good seed. The borer has destroyed the crop almost entirely this season and we have been able to collect only a few ounces of good seed.

Trimming of Trees Along the Pali Road.

Considerable trimming of trees and cutting down of brush along the Pali road has been done with the assistance of a luna and a gang of prisoners kindly granted by Sheriff Henry. Several of the dangerous corners where the brush and trees shut off the view of the road, making it risky for people driving automobiles and other vehicles, have been cleared of brush and the trees trimmed up. Other parts have been trimmed where the trees were thin and a good view could be obtained by trimming off a few branches.

Experiment Garden, Makiki.

The principal work has been the transplanting of seedlings and doing of other routine work.

Honolulu Watershed Planting.

Before any planting could be done on Sugar Loaf we found it necessary to cut convenient trails so that plants and other material could be packed to where it was wanted with the least possible delay. We have therefore cleared a trail from the Makiki station right along the east side of the ridge to the east of the station, up to and along the face of Sugar Loaf to connect with the Round Top trail. This trail is now completed and a start at making holes and planting will be commenced during the early part of September. A considerable number of koa and kukui trees are being got ready for planting.

U. S. Experimental Planting, Nuuanu Valley.

A number of trees are now ready at the small nursery for planting and as soon as the weather is suitable they will be planted out. The man has been caring for the trees at the nursery and doing other routine work.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF HYDROGRAPHY.

Honolulu, August 15, 1913.

Board of Commissioners, Agriculture and Forestry.

Gentlemen:—The following report of operations in the Division of Hydrography for July, 1913, is submitted:

G. K. Larrison, Superintendent:

On July 1 and 2 a reconnaissance, which was begun on June 30, was made of the Kahana, Waikane, Uwau, Waianu and Waiahole valleys on windward Oahu, and the Waiawa valley in central Oahu. All streams in these valleys are being rated by weirs by the Waiahole Water Company. Current meter measurements were made to check the weirs, which were found to give discharges from ten to fifty per cent. too high. The weirs were found to be in poor condition, with leakage, high velocity of approach, and with blunt uneven crests. One daily reading was being made at each station except on Sundays. The condition of these stations was reported to the chief engineer of the Waiahole Water Company. It is possible that a number of clock register stations will be established by the company, to be maintained and operated by this office.

On July 9th, Messrs. Dort, White and the undersigned made a reconnaissance to develop a direct trail between the stations on the north and south forks of the Kaukonahua streams. The trail was broken through from the south fork to within a short distance of the north fork stations, but the attempt was abandoned on account of topographical difficulties.

On July 10 a reconnaissance was made, in company with the Superintendent of Forestry and the chief engineer of the Bishop Estate, of the lower Kawailoa region.

On July 19, accompanied by Mr. H. Kimble, assistant engineer, the writer sailed for Kona, Hawaii, and the balance of the month was spent on a field reconnaissance in that district.

The balance of the month was spent in general administration work.

J. C. Dort, Office Engineer, Oahu:

On July 1 the rain gages on Konahuanui, 3100 feet; Mt. Olympus, 2440 feet, and Kaau Crater, 1700 feet, were read.

On July 9 a trail reconnaissance between the south and north forks of the Kaukonahua was made.

On July 14 a site was selected for the Kalihi stream gaging station at an elevation of about 500 feet above the sea level. This stream will probably be utilized to augment Honolulu's water supply.

On July 22 the three stations of the north and south forks of the Kaukonahua were visited, and records obtained.

The balance of the month was spent in general cost data, accounting, computing, and general office work, including reports for the annual reports of the Governor and the Superintendent of Public Works, for the fiscal year ending June 30, 1913.

C. T. Bailey, Assistant Engineer, Maui:

Mr. Bailey made ten regular and fifteen miscellaneous stream measurements, visited one rain gage, and made a reconnaissance trip covering seven days from Keanae to Kaupo. The cable for the Honokahau station was also erected. The greater part of the month was spent in routine gaging and maintenance work.

E. O. Christiansen, Assistant Engineer, Hawaii:

One regular and six miscellaneous stream measurements were made and twelve rain gages were read. On July 5 all construction on the 2700 foot trail was suspended. On July 15 a conference relative to future plans was had with the Superintendent of Hydrography in Honolulu, and from July 18 to 31 all equipment on Hawaii was brought from the 2700 foot trail by packers to Hilo and shipped to Maui.

Howard Kimble, Assistant Engineer, Kona, Hawaii:

Arrived in Honolulu on July 15, and sailed for Kona, Hawaii, on July 19. From July 20 to July 31, a saddle reconnaissance was made in company with the Superintendent of Hydrography of the Kona districts above the upper government road, extending from Honokahau on the north to Kealia on the south, ranging from 1000 feet to 6100 feet above sea level. Practically all water holes in this area were visited.

W. V. Hardy, Field Assistant, Kauai:

Mr. Hardy made six regular stream measurements and visited sixteen rain gages and two evaporation stations.

Five days were spent on cross section trail and bridge improvement work. Three old staff gages were replaced by new gages. The greater part of the month was spent in general gaging and maintenance work.

D. E. Horner, Field Assistant, Kauai:

Mr. Horner assisted Mr. Hardy on general improvement work. Six rain gages were visited, two days were spent painting gages, twelve days on trail cutting and construction, five days on improving cross sections and three days on repairing the Waianea station bridge.

G. R. White, Field Assistant, Oahu:

On July 1 and 2 Mr. White accompanied the superintendent on a reconnaissance of the Kahana, Waikane, Uwau, Waianu, Wai-ahole and Waiawa valleys. On July 9 a trail reconnaissance trip was made between the south and north forks of the Kaukonahua. On July 11 the two stations on the north fork of the Kaukonahua were visited and two measurements were made. On July 25 the station on the south fork of the Kaukonahua was visited. The balance of the month was spent on general computations and office work.

E. E. Goo, Recorder, Honolulu:

The entire month was spent on general office work, including correspondence, filing, computing, indexing, etc.

R. M. S. Goo, Computer, Honolulu:

The entire month was spent on general office work, including filing, computing, etc.

August Plans:

Kona Investigation: Mr. Kimble will assemble a working map of the Kona districts, from existing government and privately owned maps. A population and present water supply census will also be started. Field investigations and surveys are impracticable at the present time on account of the heavy rainfall. This work will be taken up later, as the rains usually stop about September 30. Mr. Kimble has been directed to employ a field assistant at \$75 per month without subsistence, who will furnish his own saddle transportation.

Mr. Christiansen will report to Mr. Bailey about August 8 to assist in the establishing of new clock register stations and general improvement work on Maui.

Oahu: A Friez clock register station will be established on the Kalihi stream and a reconnaissance of the Laie valley on windward Oahu will be made at the request of the Governor.

Promotions: W. V. Hardy, field assistant, was promoted to \$1800 per annum July 1, 1913.

G. R. White was appointed field assistant at \$1020 per annum July 1, 1913.

Hawaii Progress Report: Five hundred copies of Water Supply paper No. 318, U. S. Geological Survey, for the Hawaii District, up to December 31, 1911, were received July 31, and will be distributed in August. Copies of this report may be had free of charge by application to the undersigned.

Very respectfully,

G. K. LARRISON,
Superintendent of Hydrography.

REPORT OF AUGUST.

September 4, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following brief report of operations of the Division of Hydrography during August, 1913, is submitted:

G. K. Larrison, Superintendent.

August 1 to 8 were spent on making a reconnaissance of North and South Kona, Hawaii, in connection with the water investigation of these districts as authorized by Act 102 of the 1913 Legislature. This reconnaissance was started on July 19. On August 15 a reconnaissance was made of the lower Laie valley and on August 23 a reconnaissance was made of the upper Moanalua valley to determine the feasibility of establishing stream gaging stations. A further investigation will be made of the Laie valley. On August 21 an inspection was made of the two coöperative stations installed by the Wahiawa Water Company on the north fork of the Kaukonahua stream on Oahu, in company with W. W. Goodale, T. H. Petrie and J. C. Dort. August 27 to 29 were spent on Kauai on general inspection and consultation work which included a reconnaissance of the Waimea gorge and its principal branches. The stream beds were followed up to an elevation of about 900 feet above sea level, and future stream gaging station sites were located. The balance of the month was spent on general administration work, including the overseeing of the construction of the new clock register stream gaging station on the Kalihi stream.

J. C. Dort, Office Engineer, Oahu:

On August 1 the Pali and north fork Kaukonahua rain gages were read. On August 8 an investigation was made of the quantity of water developed in the Waiahole Water Company tunnel. The measurement showed that 17 million gallons per day were being picked up in the tunnel proper. On August 21 an inspection trip was made, in company with the superintendent, W. W. Goodale and T. H. Petrie, of the two new coöperative stations on the north fork of the Kaukonahua. August 26 to 31 were spent on the construction of the new clock register stream gaging station on the Kalihi stream. August 11 and 12 were taken on sick leave.

The balance of the month was spent on general office work, including computations, drafting, reports, etc.

*C. T. Bailey, Assistant Engineer, Maui; E. O. Christiansen,
Assistant Engineer:*

Mr. Bailey, assisted by Mr. Christiansen, visited 46 stream gaging stations, made 21 stream measurements, and set four bench

marks. The balance of the month was spent on general maintenance work, including the improvement of several stream gaging station cross sections, unpacking equipment received from Hawaii, and on computations and correspondence. Mr. Bailey spent 15 days in the field and 16 days in the office. Mr. Christiansen spent 17 days in the field and 14 days in the office.

W. T. Hardy, Field Assistant, Kauai; D. E. Horner, Field Assistant.

Mr. Hardy, assisted by Mr. Horner, visited 30 stream gaging stations and 9 rain gaging stations. Four stream measurements were made. About twenty miles of trail was constructed and about a dozen stream gaging station cross sections were cleared by blasting and by removing boulders. Mr. Hardy spent 26 days in the field and 5 days in the office. Mr. Horner spent 28½ days in the field and 2½ days in the office.

Howard Kimble, Assistant Engineer, Kona, Hawaii; H. R. Wassman, Field Assistant.

The special water investigation of North and South Kona has progressed favorably and more rapidly than was expected. A reconnaissance of both districts was completed on August 7. Since that time a general map covering all water bearing areas has been started, a population and present water supply census has been made, and 18 rain gages have been established.

H. R. Wassman was employed as a field assistant on August 18 at \$75 per month without subsistence.

G. R. White, Field Assistant, Oahu.

In the absence of the clerk on leave Mr. White handled the office work from August 8 to 28. On August 1 the mountain rain gages on Konahuanui, Olympus and Kaau crater were read. On August 4 the Waiahole-Waiawa rain gage was read. August 28 to 31 were spent on the construction of the Kalihi clock register stream gaging station.

E. E. Goo, Clerk.

Mr. Goo was on leave August 9 to 28. The balance of the month was spent on general office work, including correspondence, computing, filing, etc.

R. M. S. Goo, Computer.

The entire month was spent on computing, blue printing, and general office work.

September Plans.

Oahu: The construction of two clock register stream gaging stations on the two branches of the Manoa stream will be started.

Considerable blasting and clearing of the cross sections of six stations on windward Oahu will be begun. A further reconnaissance of the Laie valley and weir checking measurements on the Wahiawa Water Company's main ditch will be made.

Kauai: The construction of four new clock register stream gaging stations on the Wainiha, Lumahai, Hanalei and Kalihiwai streams will be started, and general trail improvement work will be continued.

Maui: The construction of nine new clock register stream gaging stations will be started. The undersigned will spend the last two weeks of the month on Maui selecting the sites for these stations.

Kona, Hawaii: The investigation will proceed along the same lines followed in August.

Stream Gaging Stations Maintained.

| Island | Aug. 1, 1913 | Discontinued | Established | Sept. 1, 1913 |
|-----------------|--------------|--------------|-------------|---------------|
| Kauai | 42 | .... | .... | 42 |
| Oahu | 25 | .... | 1 | 26 |
| Maui | 46 | .... | .... | 46 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| Total | 113 | .... | 1 | 114 |

In addition to the above private records are furnished for stream and ditches as follows: Kauai, 10; Maui, 17; Hawaii, 2; total, 29.

Main Gaging Stations Maintained.

| Island | Aug. 1, 1913 | Discontinued | Established | Sept. 1, 1913 |
|---------------------|--------------|--------------|-------------|---------------|
| Kauai | 28 | .... | .... | 28 |
| Oahu | 9 | .... | 1 | 10 |
| Maui | 18 | .... | .... | 18 |
| Kona, Hawaii. . . . | ... | .... | 18 | 18 |
| | <hr/> | <hr/> | <hr/> | <hr/> |
| Total | 55 | .... | 19 | 74 |

In addition to the above private records are furnished for rain stations as follows: Kauai, 6; Oahu, 1; Maui, 16, Hawaii, 11; total, 34.

Very respectfully,

G. K. LARRISON,
Superintendent of Hydrography.

The new Chinese republic has established a department of agriculture and forestry. For a long time China had been pointed out as the most backward nation in forest work.

THE KALO IN HAWAII. III.

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

VARIETIES.

There are a great many varieties of kalo. The subject has never been thoroughly studied. Barrett divides the kalos roughly into three groups:

- a. Kalos with striped petioles.
- b. Kalos with red petioles.
- c. Dasheen kalos, or those which produce tubers about the corm.

From a commercial standpoint the varieties differ from one another in the size, form, color, flavor, and general quality of the corm or tubers; in the time needed for maturity; and in the amount of water needed for growth. The matter of varieties of Hawaiian kalo is one that is worthy of careful investigations. The authors have found that the natives have over two hundred and fifty names for varieties of kalo. Some of these names are undoubtedly synonyms, but the fact remains that they habitually recognized as distinct forms at least 150 to 175 kinds. Concerning many of these varieties it has been possible to obtain somewhat detailed information. The U. S. Agricultural Experiment Station, through its sub-station in the Hilo, Hawaii, district, is collecting and planting varieties obtainable at the present time. Some of the types are already extinct. With the rapid decline of Hawaiian lore, and with the transferral of kalo production from the Hawaiians to the Chinese, the Hawaiian's knowledge of the kalo must be quickly recorded or lost forever.

The following list includes all of the varietal and subvarietal names collected by the authors. The majority of these names have been checked and verified:

HAWAIIAN NAMES FOR KALO VARIETIES.

1. A'A. Grown chiefly in unirrigated fields, sometimes in *lo'i*. It is not commonly grown at the present time; does not occur on Oahu, but is grown somewhat on Hawaii. The interior of the corm is whitish or gray. The leaf blade and petiole is clear green, unmarked. The blade is somewhat convex, or saucer shaped (*apiipii*) like *Apuwai*. The poi is likely to be watery (*hehee*) and lacking in the proper consistency; it therefore requires considerable skill in pounding.

2. AAPU. There are three sub-varieties of this kalo. The names of two are not known to us.

3. AAPU LEHUA. Said to be synonymous with *Kumu* q. v.

4. AHAKEA. This name is known on Oahu as a synonym for *Haokea* q. v. Corms under this name were sent in 1908 to the U. S. Dept. of Agriculture, by Mr. L. C. Lyman, of Hilo.

5. AHE. This is a wild kalo, never grown in *lo'i*, but occurring spontaneously in uncultivated marshy places. The interior of the corm is suffused with reddish or brownish; the corm is markedly smaller than the cultivated kalo, and is inferior to them in quality. It was eaten only in times of scarcity. The leaf blade



KALO PI'IALI'I KEOKEO.

The corms are about six inches long. Note the length of the petioles, their white bases and smooth texture. Note the true roots that emerge from the corm.

and petiole is also suffused with reddish or purple; the young leaves make excellent *lu'au*.

6. AIMAHAA. Probably a synonym of *Mahaha* q. v.

7. AKIAHIALE.

8. AKOKI. This name is known on Oahu.

9. AKOLE KA UULA.

10. ALA. A synonym for *Manahaulaula*. *Ala*, fragrant, refers to the fragrance of the corms when cooked.

11. ANELI'I.

12. API'I. Also called *Apü-pü*. Two sub-varieties, *kea* and *ulaula*, as follows:

13. API'I KEA. This kalo, in the characteristics of corm and huli, strongly resembles the *Ha'okea*, but may be distinguished from it by the shape of the leaf-blade, that of *Api'i kea* being somewhat orbicular (*poi-poi*) while that of *Ha'okea* is quite elongated. The *poi* is of good quality, and light gray in color. This kalo in early times was among the favorite varieties of the chiefs.

14. API'IPI'I. Synonym for *Api'i* q. v.

15. API'I ULAULA. A large kalo, formerly cultivated for offering to the gods, and other sacred purposes. Not raised for common or general uses, but used by the kahunas in their rites. The interior of the corm is dark gray.

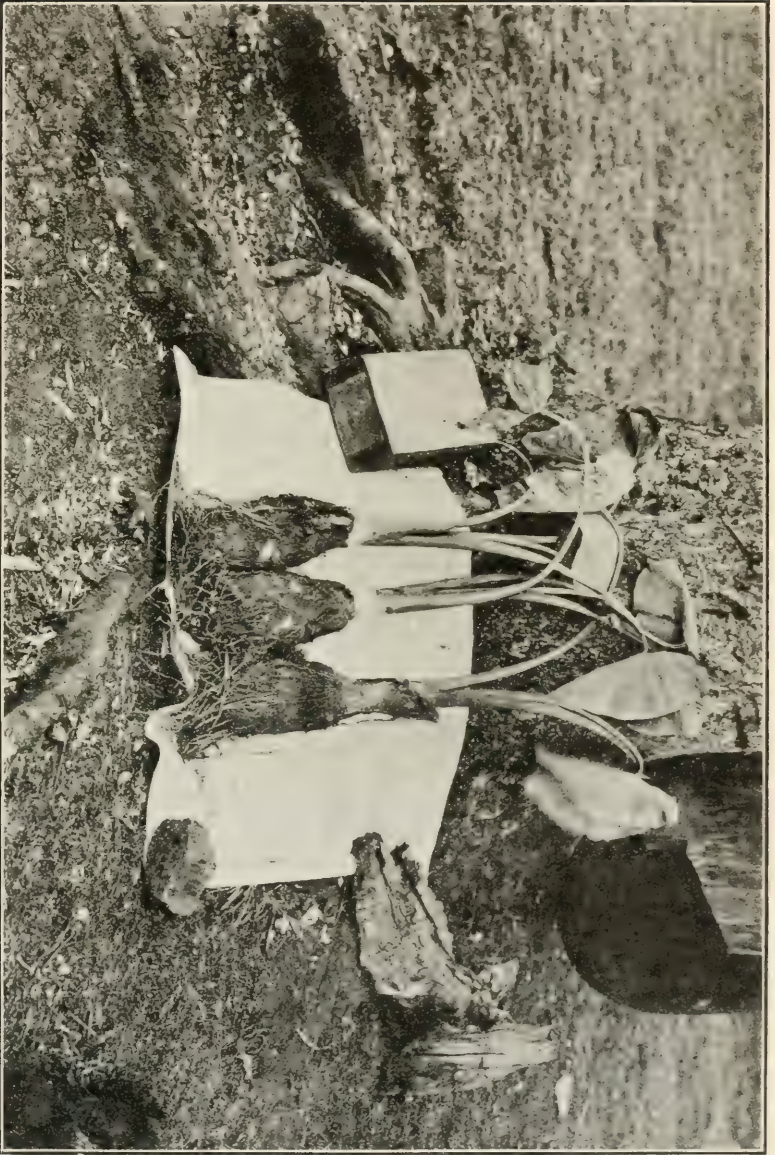
16. APO. A wet land or *lo'i* kalo, raised abundantly on Oahu. The interior of the corm is white. The petioles are quite dark greenish, sometimes almost purple-black. The corm makes very good *poi*. This kalo was not considered suitable for offering to the gods.

17. APOWAI. Probably a synonym for *Apuwai*, q. v.

18. APOWALE. A name known on Oahu.

19. APUWAI. The leaf-blade of this variety is convex or cup-shaped, catching and retaining the rain water. Hence it is likened to a water-cup (*apu-wai*). There are two sub-varieties, *keokeo* and *ulaula*, as follows:

20. APUWAI KEOKEO. Cultivated, and also sometimes occurring wild in wet places near the woods. It is raised exclusively in *lo'i*, and is common throughout the islands, well-known localities being Kohala, Hawaii; Wailuku, Maui, and Pauoa, Oahu. That raised in the *ahupuaa* of Dole in olden times had the reputation of being the best kalo grown in Kohala, and was always preferred to other kinds. The Chinese planters in Kohala, who previously raised *Piko*, have given it up, and now raise *Apuwai* because it matures three months sooner than the former. It was formerly raised in Nuuanu, Oahu; and also in Kalihi, but in the latter valley it is now supplanted by the *Hachae*, q. v. The corm is white within, soft in consistency, and easy to pound and make into *poi*. The leaf-blade and petiole is dark green. The blade is cup-shaped, with a crinkled margin, and the entire surface is somewhat wrinkled. The *piko* is darker than the surrounding area.



KALIO UATA.

Propped against the base of a mango tree. Note the shape of the corms; the fibrous roots; the venation and texture of the leaf-blades; and the arrangement of petioles with respect to one another. Behind the tree is a large *pot* board.

This kalo is good either steamed or as *poi*; the leaves make good *lu'au*. This kalo requires about twelve months for maturity.

21. *APUWAI ULAULA*. This kalo is similar to *Apuwai keokeo* save as to the color of the corm and petiole, which are reddish or pink. The upper portion of the corm is markedly suffused with pink. The petioles are purplish at their bases. The *poi* is pink, and is superior to that of the *Apuwai keokeo*, which is soft and mushy. The *poi* of this kalo was highly esteemed by the chiefs in ancient times.

22. *AUAULEONU*. Grown only in unirrigated fields, never in *lo'i*. Raised commonly in Kona, Hawaii. The interior of the corm is whitish, and makes good *poi*. The foliage parts are clear green with no conspicuous markings.

23. *AWEOWEO*. This variety is also known under the name of *Aweuweu*, *Mamauweo*, or *Ma'auweo*. It is sometimes erroneously called *Ka'i aweuweu*. The name *Aweoweo* refers to the very shaggy or fibrous exterior of the corm. *Mamauweo* indicates that the corm is tasteless (*ono-ole*), and unpalatable. This is a wild kalo, growing in wet and marshy places near the forest line, with ferns and similar plants. It does not grow satisfactorily when planted in *lo'i*, as it forms an abundant top, but no corm. The corm is small, hard, and whitish within. It cannot be eaten when steamed, because of its pronounced acidity, but must be made into *poi* before eating. The *poi* is of good quality, but the corms are so small and scattered that they are used only in times of scarcity, when other food fails. This kalo has a spreading habit, the corm sending out underground offshoots, and so the natives sometimes refer to this as *na-kalo-i-ku-e*, "the kalo that separates itself," or "stands by itself." The foliage is clear green; the petiole sometimes darker. The leaves are good for *lu'au*. This variety was not considered suitable for medicinal purposes, nor for offering to the gods.

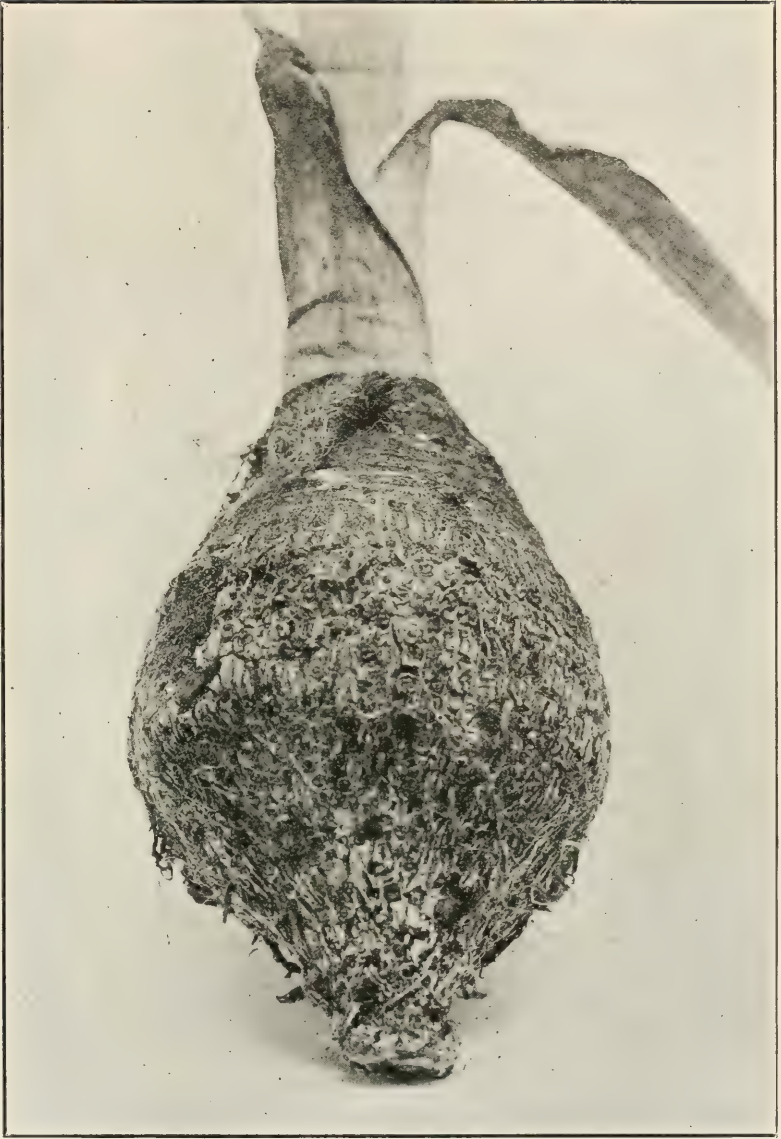
24. *AWEUWEU*. Synonym for *Aweoweo* q. v.

25. *ELEE*. Probably a synonym for *Eleele*, q. v.

26. *ELEELE*. Cultivated both in unirrigated fields and in *lo'i*. The interior of the corm is dark gray, very similar to that of *Popolo*. The leaf-blade is dark green, the petiole is dark purplish green. This variety was not considered suitable for medicinal purposes, nor for offering to the gods. The young leaves make good *lu'au*, but care must be taken, in collecting the leaves, to gather but a few from each plant, else the corms will be stunted in their development.

27. *ELEELE NAIOLA*.

28. *ALEPAIO*. There are several fanciful explanations of the meaning of this name; according to some natives, this kalo grows spontaneously up near the woodlands where the beautiful *clepaio* bird makes its home. According to others, this kalo must be planted only at early dawn, while the *clepaio* bird is singing. It



CORM OF PI'TALI'T ULAULA.

Weight: 502 grams. Dimensions: 14 cm. x 9 cm. This is a type of corm found commonly in the markets.

is usually planted in unirrigated fields, and is raised largely on Hawaii. The interior of the corm is suffused with yellow, the leaves are clear green, spotted or mottled with darker.

29. EULA. Synonym for *Eulu*, q. v.

30. EULU. *Ulu* means to grow, *ulu* has reference to growth in a spreading manner; this *kalo* sending out underground shoot or runners. There are two sub-varieties, *keokeo* and *kahu uwawahi*, as follows:

31. EULU KEOKEO. Similar to the succeeding variety, save that the corm is white within, instead of yellow, and the petiole is clear green instead of blackish.

32. EULU KOHU UWAWAHI. This *kalo* is both wild and cultivated. It is grown in unirrigated fields, chiefly in Kona, Hawaii. The corm is yellow within, and is very acrid, being unsuited for eating immediately after cooking. The leaf-blade is clear green in color, and *rough* in texture. The petiole is quite dark, or blackish. The *poi* is good. Because of its pronounced acidity, this variety is not suitable for *lua'u*, nor for medicine. In unirrigated fields this variety matures in seven months, in *lo'i* it requires thirteen months. According to native tradition it must be planted only when the moon is waxing, never when it is waning.

33. HAAKEA. Undoubtedly a synonym for *Ha'okeo*, q. v.

34. HAAWIKEA. Perhaps a synonym of *Kaekeo*, q. v.

35. HAEHAE. This *kalo* grew originally in Kaanapali, Maui, a region where strong winds blow almost continually, so that the leaves of the *kalo* were tattered and torn (*hachac*). This name is sometimes erroneously spelt *haihai*. There are two sub-varieties, *keokeo* and *ulaula*, as follows:

36. HAEHAE KEOKEO. Cultivated both in unirrigated fields and in *lo'i*. Abundant in Kalihi Valley, Oahu, and in other parts of the islands. The corm is white within, and is *very large*, sometimes as big as a coconut, so that it must be cut into pieces before steaming in the *imu*. The leaves are also quite large, with long petioles (3-4 ft.), so that the ground is completely shaded, and the growth of weeds is prevented, rendering the field very easy to cultivate. This self-weeding habit makes it a lazy man's favorite. The petioles attain their greatest size in unirrigated fields. Formerly the *Apuwai* was the chief *kalo* of Kalihi, but after a time the corms became badly diseased. A native woman, Haaele, introduced the *Hachac* from Kaanapali, Maui, because its large corms, even though partially decayed, could be profitably used, that is, a large portion remained after the decayed regions had been cut away.

37. HAEHAE ULAULA. Similar to the preceding, but with pinkish corm and *poi*.

38. HALOA. A name used on Oahu.

39. HAO.

40. HAOKEA. A well-known kalo, also called *Haakea*, *Haawikea*, *Ahakea*, and *Mahakea*, q. v. There are two sub-varieties, *haulaula* and *keokeo*.

41. HAOKEA HAULAULA. Similar to *Ha'okea keokeo*, q. v., save that the corm and *poi* is somewhat pinkish. Also called *Ha'okea hauliuli*. This kalo was not considered suitable for offering to the gods.

42. HAOKEA HAULIULI. Synonym for *Ha'okea ulaula*.

43. HAOKEA KEOKEO. A cultivated kalo, never growing wild, but raised both in *lo'i* and in unirrigated fields. Was once grown abundantly in Pauoa, Nuuanu and Kalihi, Oahu, but the Chinese planters of today prefer *Piialii*. The interior of the corm is whitish; the corm forms a great quantity of *oha* (see propagation). The leaves are clear green, and resemble the leaves of *Apuwai*. The *poi* is excellent. *Lua'u* of this kalo was formerly prized highly by the *kahuna*, as the kalo was considered very desirable for offering to the gods. The corms mature in eight months, they can remain in the ground for ten months without serious deterioration, but after this period they spoil and are worthless. The Chinese planters pull them at six months, but this is much too soon.

44. HAOLE LUAHINE. This kalo has an apt and comical native name. *Haloe lua hine* means "elderly foreign lady." Each period of growth of the corm of this kalo is closed by a pronounced constriction, so that a corm might be fancifully likened to the head and body of a person. The native women did not confine their bodies at the waists, and were, of course, greatly surprised at the constricted waists of foreign women. This kalo is therefore likened, in its constricted corm, to a plump, corseted, foreign woman. The interior of the corm is yellowish, and the petioles are also somewhat yellowish.

45. HAPU'U. See *Hapu'u kea*.

46. HAPU'U KEA. A kalo that is cultivated in damp places near the edge of the forest, both in *lo'i* and unirrigated fields, not growing wild. A notable locality for this variety is Koloa, near Hana, Maui. The corm is of large size, with whitish interior. The leaf is clear green, the base of the petiole is much darker. The *poi* is light colored, and good in quality. The *lua'u* is good. This kalo is not suitable for medicinal usage, nor for offering to the gods. It matures in one year.

47. HAPU'UPU'U. Synonym for *Hapuu*, q. v.

48. HEE. Raised in *lo'i* throughout Oahu. The foliage is clear green; the corm within is whitish. Connected with this kalo is an interesting ancient legend, which is given in outline herewith: *Kamapua'a*, the hog-god, struggled with *Pele*, the goddess who inhabited the volcano of Kilauea. He was vanquished and fled, first into the sea, then into the kalo *lo'i*, and finally into the forests. In each region he passed through five transformations,

in order to deceive and elude *Pele*. These transformations were—*hee*, *manini*, *kumu*, *pūco*, and *kala*, so there are now five kinds of fishes, of *kalo* and of forest trees known by these respective names. *Pele* could not follow *Kamapua'a* into the *kalo lo'i* because her eyes were bleared with the salt water. *Hee* means "squid;" squid was a very acceptable offering to the gods: if one could not be obtained, the *huli* of this *kalo* might be taken and divided into eight parts, so that it resembled the squid in whose place it was offered, hence the name.

49. HEILIA.

50. HEKILI. *Hekili* (thunder) was a king of Maui, who died in 1791. He was noted because one side of his body was tatued black. This particular *kalo* was his favorite variety, so it was named after him. This *kalo* was raised in ancient times, both in *lo'i* and unirrigated patches, never occurring wild. It is rare now. The interior of the corm varies in tint from light to dark gray. The foliage has no special marking, save that the petiole is sometimes reddish. The *lua'u* is good. This variety is not used in the preparation of native medicines, although it was used by the *kahunas* in their sacred rites.

51. HELE MAUNA.

(To be continued.)

The Balkan War has brought about a rise in certain lumber prices in Europe because of the big demand for wood for ammunition boxes.

Dogwood, the principal source of shuttles for use in cotton mills, is growing scarcer year by year, and various substitutes are being tried, but with no great success.

Experiments with a tree planting machine at the Utah agricultural experiment station indicate that it may be used to advantage in reforesting old burned areas on the national forests.

The leading forest schools of the country not only have their own forest tracts for continuous experiments, but give their students actual experience in the woods by having them take part in big lumbering operations.

France has spent \$35,000,000 in planting trees on the watersheds of important streams.

According to the Canadian forestry association 50 per cent. of Canada is capable of growing nothing but timber crops.

A shingle mill in Maine uses 2000 cords of paper birch each year in the manufacture of toothpicks.

Hawaiian Gazette Co.

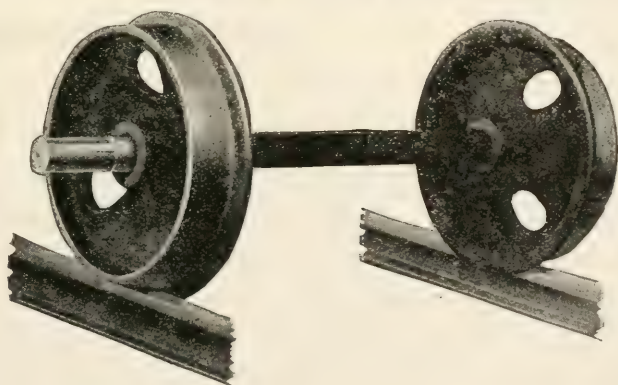
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Applications for publications should be addressed to the Mailing Clerk, P. O. Box 207, Honolulu, Hawaii.

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OCTOBER, 1913.

No. 10

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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
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THE HAWAIIAN FORESTER *and* AGRICULTURIST

VOL. X.

OCTOBER, 1913.

No. 10.

This number is featured with full details of recent forest reserve accomplishments.

NEW PLANTS DISCOVERED IN STUDY OF GRAZING LANDS.

In making a study of grazing lands on the national forests, 125 entirely new species of plants have been discovered by the government's experts, and will be named and classified by the botanists of the Department of Agriculture.

Their discovery came about through the collection of some 9000 different plant specimens, with notes as to their habits of growth and forage value. This work is part of a comprehensive plan to determine the grazing value of every acre of national forest land, in which the capacity of the soil to grow certain forage crops is to be determined and an effort made to decide for which class of stock—sheep, cattle, or goats—the range is best suited.

The men who have made the studies have combined the qualities of practical stockmen and trained botanists. They divided the areas into such small subdivisions that maps have been prepared which show exactly the kinds of feed which grow on each acre, and the time of year it is ready for grazing. The maps also show the stock's water supply and indicate the kind of stock best suited to the area.

The investigation also showed the examiners many areas covered with flourishing plants which apparently should furnish excellent grazing, but which were not of a character relished by stock; these areas, therefore, had little or no stock-carrying capacity.

As a result of the study, the forest service announces that it will be in a position to perfect its system of grazing management to bring about still better conditions for both stock and range.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, October 6, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Dear Sir:—I beg to submit herewith a service report on the work of this division for the month of September, 1913. From this it will be seen that a number of the larger dairy herds in the city and county have been retested for tuberculosis, after an interval of only three months from the previous test, as compared to one year as hitherto practised.

The results are gratifying so far as the decrease in numbers of reacting animals is concerned, and careful post mortem examinations of said reactors demonstrate fully that the disease is practically wiped out, though not entirely so. This condition corresponds exactly with what is met with in other countries where efforts are being made to eradicate bovine tuberculosis, and also demonstrates that the work must be pushed to a finish now in as many herds or dairies as possible—or the work of years will have been wasted. If, for some reason or other, the disease cannot be eliminated from certain herds, such herds must be proclaimed or "posted" as infested until they have been freed from infected animals. To allow milk from known reactors—that is, cows proved to be infected with tuberculosis—to be sold for human consumption should no longer be tolerated, and when the disease has been reduced to such slight minimum as that which persists here at the present time, it would seem unwise not to carry this great piece of work to a successful end.

It is therefore recommended that every infested herd in the city and county be retested in short order, until the last reacting animal has been disposed of and the disease wiped out. There are now 74.28 per cent. of clean herds and only 25.72 per cent. remain to be dealt with further. When these have been attended to there only remains the problem of preventing a reinfection of the island through diseased cows from the other islands or from abroad. To this end it may become necessary to quarantine against the other counties, in so far as dairy cattle and products are concerned, until such time as these counties see fit to eradicate bovine tuberculosis. To prevent the entrance of fresh infection from abroad it will be necessary to amend the present regulations pertaining to the importation of live stock, to require that dairy cattle intended for importation here must come from clean herds; that is, herds certified to by the local health authorities to have been free from tuberculosis for at least one year, and to guard against infection in transit.

The international medical congress held in London this fall

came to the conclusion that it is far cheaper and more effective to eradicate bovine tuberculosis than to build hospitals, sanatoriums, Pasteurizing plants and surgical clinics to deal with the countless numbers of scrofulous (tuberculous) children which annually receive the infection through cows' milk. With this fact before us there can be no doubt that we are working along the right lines; that is, lines which were adopted here at least four years before the foreign authorities (England) were forced, by pressure of public opinion, to adopt exactly the same measures as have been pursued here for that length of time.

The above is a concise resumé of the present bovine tuberculosis situation in this county and as such is recommended for publication.

I have also under preparation a series of short articles dealing with various subjects of general interest to the live stock, dairy and poultry producers of the Territory, as, for instance—"Hog Cholera, its Curative and Preventive Treatment," "Eye Worm in Chickens," "Heart Worm in Dogs," and "Cerebro Spinal Meningitis or Blind Staggers in Horses and Mules." If the same meet with the approval of the Board it is recommended that the same be published and that a number of reprints of each article be secured for the future use of this division in furnishing information on the subject in question.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, September 30, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of September:

Tuberculosis Control.

The following dairy herds have been subjected to the intradermal tuberculin test:

| | T. | P. | C. |
|-----------------------------|----|----|----|
| Sept. 4-6—F. K. Makino..... | 3 | 2 | 1 |
| Y. Tsudo | 7 | 7 | 0 |
| " 6-9—V. Bowen | 1 | 1 | 0 |
| " 8-11—F. Johnson | 7 | 7 | 0 |
| E. C. Smith | 8 | 8 | 0 |
| J. Schwenk | 7 | 7 | 0 |
| T. Dado | 10 | 10 | 0 |

| | | | |
|---------------------------------------|-----|-----|---|
| Sept. 9-12—Waimanalo Plantation | 23 | 23 | 0 |
| J. A. Templeton | 39 | 39 | 0 |
| " 10-13—Salvation Army | 4 | 4 | 0 |
| J. Gouviera | 8 | 8 | 0 |
| Frank Gomes | 8 | 8 | 0 |
| " 15-18—Waialae Dairy | 90 | 88 | 2 |
| " 16-19—Waialae Dairy | 198 | 191 | 7 |
| " 19-22—Waialae Dairy | 128 | 124 | 4 |
| C. R. Frazier | 3 | 3 | 0 |
| " 22-25—Waialae Dairy | 4 | 4 | 0 |
| " 23-26—P. M. Pond | 275 | 269 | 6 |

The above gives a total of 823 head of cattle injected and examined for the month, out of which number 803 were passed and twenty condemned and branded.

The following dairies remain to be tested and will be examined on the following dates:

| | |
|--------------------------|-----------------|
| Waianae Plantation | Sept. 29-Oct. 2 |
| Y. Ogawa, Waialua | Sept. 30-Oct. 3 |
| Waialea School | Sept. 30-Oct. 3 |
| Kahuku Plantation | Sept. 30-Oct. 3 |
| Laie Plantation | Sept. 30-Oct. 3 |

Outside of the O. R. & L. Ranch and the Kaneohe Ranch the fourth general test will be complete.

Importations.

September 2—S. S. Wilhelmina, San Francisco: 21 crates poultry, 1 cat.

September 15—S. S. Sierra, San Francisco: 23 crates poultry.

September 16—S. S. Hilonian, Seattle: 16 horses, 12 cows, 1 calf, Alexander & Baldwin; 7 crates poultry.

September 23—S. S. Lurline, San Francisco: 26 mules, Schuman Carriage Co.; 3 polo ponies, W. F. Dillingham; 1 horse, A. L. Case; 1 dog, Mrs. Myatt; 25 crates poultry.

Respectfully submitted,

L. N. CASE,
Asst. Territorial Veterinarian.

The Western Pacific Railway has instructed its engineers to report fires along the right-of-way where it traverses the Plumas national forest, California. The location of fires is indicated on a card dropped by the engineer or fireman to the next section crew met after the fire is discovered. It is then the duty of part of the section crew to go back on handcars or speeders and put out the blaze.

DIVISION OF ENTOMOLOGY.

Honolulu, September 30, 1913.

Board of Agriculture and Forestry.

Gentlemen:—I respectfully submit the report of the work of the Division of Entomology for the month of September, as follows:

During the month 34 vessels arrived at the port of Honolulu, of which 22 vessels carried vegetable matter.

| Disposal. | Lots. | Parcels. |
|------------------------------------|-------|----------|
| Passed as free from pests..... | 1,202 | 26,948 |
| Fumigated | 4 | 82 |
| Burned | 38 | 45 |
| Treated before releasing | 1 | 1 |
| Total inspected | 1,245 | 27,076 |

Of these shipments, 26,874 packages arrived as freight, 101 packages by mail and 101 packages as baggage of passengers. There were eight packages of vegetables and 28 packages of fruit taken from the baggage of passengers and destroyed.

Rice.

During the month 15,022 bags of rice arrived from Japan. Of this amount 500 bags of rice were found to be infested with rice weevil and rice moth (*Paralipsa modesta*). All other rice was found after close inspection to be free from pests and was passed.

Pests Intercepted.

Several shipments of pears and apples arrived and were found to be infested with codling moth.

Paralipsa modesta and *Colandra cryzae* were found on rice from Japan.

Rose *aphis* were found on roses which arrived from San Francisco.

Queenbees.

Four queenbees were imported during the month of September.

Hilo Inspection.

Brother Matthias Newell reports the arrival of seven steamers and three sailing vessels, of which five steamers carried vegetable

matter, consisting of 207 lots and 3188 packages. After thorough inspection all were found to be free from pests and were passed.

Oriental Shipments.

There arrived at Hilo, per S. S. Kiyo Maru, 6000 bags of rice, 235 bags of beans and six bags of sesame seeds. All of these shipments, being found free from pests, were passed.

Inter-Island Inspection.

During the month of September inspections were made at 63 steamers and the following shipments were passed:

| | | |
|------------------------|-------|----------|
| Taro | 549 | bags |
| Plants | 387 | packages |
| Fruit | 16 | " |
| Vegetables | 54 | " |
| <hr/> | | |
| Total passed | 1,006 | " |

The following packages were refused shipment:

| | | |
|-------------------------|----|----------|
| Plants | 12 | packages |
| Fruit | 11 | " |
| <hr/> | | |
| Total refused | 23 | " |

These were refused shipment on account of infestation and of soil attached.

Respectfully submitted,

J. C. BRIDWELL,
Asst. Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, September 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for September, 1913, and to transmit, as usual, the report of the forest nurseryman, covering the parts of the work especially in his charge.

ROUTINE WORK.

During the first week of September I completed two special reports, accompanied by maps, on forest conditions on Maui,

and later in the month brought to the point of final action four forest reserve projects that are to be considered at a public hearing on October 8, viz: Kohala Mountain, Upper Waiakea, Upper Olaa, Hawaii, and Honolulu Watershed, Oahu. A good share of my time during the remainder of September has been given to the arrangement of details of forest fencing projects and in checking up, at the Land office, the exact requirements under government leases as to forest protection and fencing.

FOREST FENCING.

I am glad to report that, on September 22, the executive officer of the Board signed letters authorizing the construction of sections of fence on the forest reserve boundaries at Nahiku and at Makawao, Maui, and on September 25 authorized the construction of another similar fence at Moloaa, Kauai. This action marks the actual beginning in the woods of work of which it is expected the next two years will see a good deal—practical forest protection made possible through the use of the water revenues from the forest reserves.

HONOLULU WATERSHED.

On September 11, at the request of Major Cheatham, chief quartermaster for Hawaii, U. S. Army, there were cut, under my personal supervision, in the Tantalus forest, near the Halfway house, nine eucalyptus trees, from which were taken 15 gate posts for use of the signal corps at Fort Shafter.

During September laborers working under the direction and at the expense of the Trail and Mountain Club and Mr. W. R. Castle have repaired in a satisfactory manner the so-called "Castle" trail along the slope of Pauoa Valley from the hogback on Tantalus to Pauoa flat and the Konahuanui ridge; the so-called "Cooke" trail from the Nuuanu dam to Pauoa flat; and done some work on the Olympus trail as far as the Manoa-Palolo ridge. The Trail and Mountain Club has arranged to continue the work by the construction on this latter section of the necessary side and cross drainage ditches, which were not made when the trail was first built, several years ago. With one exception no further slides have taken place along this trail. The places where slips did occur soon after the trail was built are slowly beginning to be covered by vegetation.

In regard to the planting of koa and kukui in the Makiki basin on the slopes of Sugar Loaf, substantial progress has been made during the month in making ready for the actual setting out of the little trees, which will commence with the coming of the winter rains. Mr. Haughs' report gives the details of this work.

FOREST FIRE NOTES.

I am informed by Mr. C. C. Conradt, district fire warden for East Molokai, that the two men who started the fire on the land of Wailua, Molokai, on July 23, 1913, pleaded guilty when brought to trial and were fined \$25 each. A few such convictions ought to have a salutary influence in causing the forest fire law to be respected. No forest fires have been reported the past month.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, September 29, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit my report for the month of September, 1913:

Nursery—Distribution of Plants.

| | In Seed Boxes. | In Boxes Transplanted. | Pot Grown. | Total. |
|------------------|-------------------|---------------------------|---------------|-------------|
| Sold | 2,000 | 200 | 680 | 2,880 |
| Gratis | 4,000 | 200 | 837 | 5,037 |
| | <hr/> 6,000 | <hr/> 400 | <hr/> 1,517 | <hr/> 7,917 |

Collections.

| | |
|---|---------------|
| Collections on account of plants sold amounted to | \$ 6.60 |
| Rent of building, Nursery grounds, for month of August . . | 35.00 |
| Total | <hr/> \$41.60 |

Plantation Companies and Other Corporations.

The distribution for the month under this heading amounted to 10,000 seedlings.

Experimental Garden, Makiki.

The principal work at this station has been transplanting seedlings, potting plants, mixing and sterilizing soil and doing other routine work.

Honolulu Watershed Planting.

The trail from the Makiki station to the new nursery on the ridge below Sugar Loaf has been widened so that pack animals and people desiring to ride that way can do so with ease. A tool and potting shed has been built, also six 50-gallon barrels installed for collecting water for the young seedlings. A commencement has been made to transplant the koa seedlings into tin cans. The work of making holes for the trees is also well started and a number are already dug. When the weather becomes suitable the 1000 koa trees at Makiki station will be planted on the face of Sugar Loaf, where we are at present getting the holes ready. Some five or six thousand more koa seedlings will be transplanted into tin cans and cared for at the new nursery on the ridge until they are ready to be planted out.

U. S. Experiment Planting, Nuuanu.

The man has been attending to the trees in the nursery and hoeing the smaller trees recently planted out.

Very respectfully,

DAVID HAUGHS,
Forest Nurseryman.

*IMPORTANT ADDITIONS TO THE HAWAIIAN
FOREST RESERVE SYSTEM.*

On October 13, 1913, Hon. E. A. Mott-Smith, Acting Governor of Hawaii, signed proclamations creating four additional forest reserves on the islands of Hawaii and Oahu. The list is as follows:

Kohala Mountain—North and South Kohala and Hamakua, Hawaii.

Upper Waiakea—Hilo, Hawaii.

Upper Olaa—Puna, Hawaii.

Honolulu Watershed—Honolulu, Oahu.

The Kohala Mountain forest reserve takes in the summit and upper slopes of Kohala Mountain. It covers a total area of 29,627 acres, of which 14,204 acres is land belonging to the Territory. In that Kohala Mountain is one of the important catchment areas on the Island of Hawaii, from which water is led out in the Kohala and Hamakua ditch systems, the protection of the forest cover on the head waters of the streams tapped is a matter of much moment. Kohala Mountain was one of the first localities proposed to be reserved when the forest reserve system was inaugurated in Hawaii ten years ago, but owing to a combination

of unfavorable circumstances its actual reservation has again and again been delayed. Fortunately, however, the forest itself has not suffered in consequence, for through the construction of fences on the mountain, built voluntarily by the owners or lessees of adjoining land, or under the requirements of leases, cattle have been excluded and the forest cover maintained in good condition. Besides the summit of the mountain, which is mainly in government ownership, the Kohala Mountain forest reserve also embraces the private reserves at either end of the mountain that have for many years now been maintained respectively by the Pacific Sugar Co. above Kukuihaele, and by the several Kohala sugar plantation companies in the section above their cane fields. Under recently made land leases the forest fences bordering the forest on government land will be repaired and maintained.

The Upper Waiakea and Upper Olaa forest reserves together form a continuous block of forest on the lower slopes of Mauna Loa above the agricultural land lying back of Hilo town. The areas of these tracts, which are wholly in government ownership, are respectively 51,800 acres and 9280 acres. There is no running water coming from this forest, but, as pointed out by the Superintendent of Forestry in his report, it is for the interest of the people of Hawaii that such a body of forest as this be given the protection and proper administration which a forest reserve implies. On the Upper Waiakea forest reserve are land leases that have yet some years to run. Upon their expiration the full reservation of the area for forest purposes will take place automatically.

The Honolulu Watershed forest reserve, as its name implies, embraces the slopes of the main mountain range back of Honolulu, from Kalihi to Palolo Valley. It includes an area of 6950 acres, of which 5000 acres is government land. The object of this reserve is to protect the catchment area from which is drawn the city's water supply. Being set apart as a forest reserve, the upper portions of the land can be given better protection than if left merely as tracts of unleased government land; lower down, through coöperation with the water works department, better care can be given to making all the available sources of supply do their full duty.

At the public hearing on October 8, there was also considered a modification of the boundary of the Moloaa forest reserve on Kauai. In this case 83 acres were eliminated as not being essential to the reserve and of greater value for grazing, and 34 acres were added. Provision has recently been made so that the entire lower boundary of this reserve will soon be protected by a forest fence. When this fence is completed cattle will be shut out of the forest on the whole windward side of Kauai.

Following the usual custom, the reports of the Superintendent

of Forestry, setting forth the reasons for the reservation of the above described lands as forest reserves, are given herewith.

REPORTS OF THE SUPERINTENDENT OF FORESTRY.

Kohala Mountain Forest Reserve.

Honolulu, June 5, 1913.

Gentlemen:—In October, 1908, I submitted to the Board the recommendation that a forest reserve be set apart on Kohala Mountain in the districts of Kohala and Hamakua, Hawaii. [Published in the *Hawaiian Forester and Agriculturist* for December, 1909; Vol. VI, No. 12: pp. 472-478.] The project was referred back to me by the Board to have included in the proposed reserve an additional section of certain privately-owned land at the west end of the mountain, more particularly a portion of the tract known as Kehena 2.

Since then, as the members of the Board know, persistent efforts have been made to acquire the area in question for the government, that the whole section might be set apart and maintained strictly as a forest reserve. To this end a sum of money for the purchase of the forested part of Kehena 2 was raised among the Kohala district sugar plantation companies, and later condemnation proceedings were instituted by the government for acquiring this land.

Up to the present time these efforts have not been successful, nor is the outlook good that this addition will be made in the near future, as the special fund pledged by the Kohala plantations has recently been withdrawn.

On July 1, 1913, the existing leases expire on the large government land of Puukapu that embraces the greater part of the summit of Kohala Mountain, as well as on one or two other tracts that also run up into the proposed Kohala Mountain forest reserve. These lands are now held by the Parker Ranch. This ranch has for some years now maintained fences on the mountain bordering the forest. At the time the fences were being built the ranch got out the wild cattle then at large on that mountain.

The object of postponing the creation of the Kohala Mountain forest reserve was primarily to bring pressure to bear toward getting the whole forest area on the Kohala Mountain included in the reserve. In practice it has not worked out so, and especially now that action on Kehena 2 appears likely to be slow in coming to a head, it seems advisable not to wait longer before setting apart the remainder of the lands on Kohala Mountain. I therefore recommend that this project be taken up and disposed of. An addition to the area of the reserve can readily be made later, if Kehena should then be available.

The area now recommended to be reserved differs a little from

that suggested in my original report in that the reserve as now proposed includes the private forest reserves that have for ten years or more been maintained above the Niulii, Halawa and Kohala plantations in Kohala. The forest line back of Waimea has also been slightly modified, recent surveys having made available more accurate data than were to be had in 1908. Above the recently laid out Puukapu homestead lots, second series, the forest line has been somewhat changed in location, as by so doing it was possible to secure, as one of the terms of the lease of the remnant of government land adjoining, the building and maintenance of a substantial fence on the forest reserve boundary. No part of the lands of Kehena 2, Kahua 1 and 2, or Waika is included in the reserve as now proposed.

The accompanying revised description, prepared by the Government Survey Office, gives the location of the boundary in detail. The total area of the Kohala Mountain forest reserve as now recommended is 29,627 acres. Of this 14,204 acres, 47.9 per cent., is land belonging to the Territory.

For the reasons set forth at length in my original report on this project, under the date of October 14, 1908, I now recommend that the Board approve the creation of the Kohala Mountain forest reserve and that the governor be requested to hold the necessary hearing and thereafter to set this area apart as a forest reserve, in accordance with law and custom.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Upper Waiakea Forest Reserve.

Honolulu, June 6, 1913.

Gentlemen:—I have the honor to submit as follows the recommendation that a forest reserve be created to cover the central forested portion of the government land of Waiakea, district of Hilo, island and county of Hawaii:

Location, Object and Area.

Waiakea is a large government land stretching from the sea at Hilo bay well up on the slopes of Mauna Loa. Much of the lower portion is in cane; the extreme upper part is more or less open grazing land, crossed by lava flows. Between is a section of heavy forest. The present recommendation is that the forested portion be set apart as a forest reserve, with the objects (1) of bringing the land under the management of the department of the Territory especially equipped to care for it, so that (2) it may be wisely administered in any way not inconsistent with its maintenance as a forest that may in the future be deemed best.

Owing to the geological formation of the island of Hawaii there are no running streams south of the 1855 and 1881 lava flows that come down the side of Mauna Loa back of Hilo town on lands lying immediately to the north of Waiakea. It is quite possible that springs and water holes may later be discovered in the Waiakea forest, for at present almost nothing is known accurately about the interior of this tract; but there are no running streams coming from it.

The question of stream protection does not, therefore, figure on Waiakea, but there are other reasons why it is important that existing areas of forest should receive the care and protection of the government. Until many more scientific data than are now available have been collected, it is impossible to tell how far-reaching may be the influence exerted on the country immediately surrounding large bodies of continuous forest, but it is evident that such influence does exist and that it is beneficial. Particularly is this true in the tropics and sub-tropics.

Further, on Waiakea it may happen that in time the question may arise of devoting portions of this forest to commercial utilization. To safeguard the interests of the government in all these ways and to be ready for any sort of development that may come about, it is desirable that the Waiakea forest become the Waiakea forest reserve.

The area proposed to be set apart is 51,800 acres. Of this 600 acres is a part of the land of Piihonua, a remnant mainly covered with lava, between the boundaries of the Hilo forest reserve and Waiakea. Piihonua is now under lease No. 103 to Hon. John T. Baker, expiring on March 21, 1921.

At the present time all of the land of Waiakea is under an expiring 30-year lease to the Waiakea Mill Co. (No. 124) that runs out on June 1, 1918. No use is at present made of the forest. Beyond the general clause against waste, common to the leases of that time, the lessees are not obligated to protect the forest.

The forest on Waiakea is a practically unexplored region. It is a dense stand of the rain-forest type. Ohia-lehua is the predominating tree. Along its lower side, where the forest is crossed by the Olaa flume, are numerous groups of loulou palms, growing in company with great tree ferns. And throughout, so far as the interior is known, there is a dense stand of the undergrowth characteristic of this type of Hawaiian forest.

Boundaries.

The upper and lower boundaries of the proposed Upper Waiakea forest reserve have been somewhat arbitrarily fixed by drawing lines across the land from known points on the outside boundaries, but it is believed that they serve the purpose at this time as well as if they had been run out on the ground. The makai line very nearly parallels the flume constructed to carry water

from upper Kaumanu to the Olaa plantation. The upper line leaves out of the reserve the area suitable for grazing above the native forest.

The elevation of the makai boundary is approximately 1800 feet; that of the mauka line varies from 5000 feet at Puu Kalani to 4500 feet at the 1855 lava flow, where the proposed reserve joins and forms a continuation of the existing Hilo forest reserve.

Description.

A technical description of the boundary, prepared by the Government Survey Office as C. S. F. 2430, accompanies this report.

Recommendations.

For the reasons above set forth I do now recommend that the Board approve this project and call upon the governor of the Territory to set apart this government land as a forest reserve to be known as the Upper Waiakea forest reserve.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Upper Olaa Forest Reserve.

Honolulu, June 18, 1913.

Gentlemen:—I have the honor to submit as follows, the recommendation that the remainder of the mauka portion of the government land of Olaa, to the north and west of the various subdivisions of homestead lots in the district of Puna, island and county of Hawaii, be set apart as a forest reserve. This land all belongs to the government. It is not now under lease. The area is 92.80 acres.

Object.

The reasons for the reservation of the Olaa forest remainder are largely the same that prompted me a short time since to recommend the reservation of the adjoining forest land of Waiakea, mauka (see report, dated June 6, 1913). Indeed, these two tracts, forming a continuous forest, are really to be considered together. They are only reported on separately because, for purposes of description, it was found desirable to treat them as two units rather than one.

No running water comes from the Upper Olaa forest. Its reservation as a forest reserve is justified, rather, because of the fact that the question may some time arise of exploiting its timber. It is none too soon to make provision against that time. One essential reason for setting the land apart now is that it may be brought under the care and control of the Territory's forest department.

Like Waiakea, the upper portion of Olaa bears a heavy stand of forest. Ohia-lehua is the predominating tree, but with it in mixture are many other species. On its western edge the Upper Olaa forest joins the Bishop Estate land of Keauhou, on which is a heavy stand of the tallest and largest koa in the Territory. A section of Keauhou some seven miles long by one mile in width has for 10 or 12 years been held by that estate as a private forest reserve.

The heavy koa forest does not extend much, if any, on to Olaa, but near the Keauhou boundary, on the government land, is a fine stand of large tree-ferns (*Cibotium*) of perhaps as large size as any to be found in the Territory. These give at least a botanical interest to this region.

Some five years ago ohia-lehua railroad ties were, for a time, cut on the McKenzie lots, one of the homestead subdivisions of upper Olaa. Other than this, except as certain areas of forest have been cleared on other adjoining homestead lands and sold as firewood, there has been no commercial development of the upper Olaa forest.

Description.

The official description of the proposed Upper Olaa forest reserve, prepared by the Government Survey Office as C. S. F. No. 2476, accompanies this report.

Recommendation.

For the reasons given above I do now recommend that the Board approve the setting apart of this tract as the Upper Olaa forest reserve, and that the governor be called upon to hold the hearing and thereafter to issue the proclamation incident thereto.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Honolulu Watershed Forest Reserve.

Honolulu, June 14, 1913.

Gentlemen:—I have the honor to submit, as follows, a report recommending the creation of a forest reserve on the mountain ranges back of Honolulu:

Location and Area.

The area proposed to be reserved covers the slopes of the Koolau range from Kalihi valley to Palolo valley inclusive, taking in the heads of the several valleys between. It also includes for purposes of administration the planted forest on Tantalus and the Makiki park. The total area is 6950 acres, of which 5000 acres, 72 per cent., is land belonging to the Territory. The proposed

boundary, together with other lines and an indication of the topography, is shown on the accompanying map, prepared by the Government Survey Office. I recommend that this reserve be called the Honolulu Watershed forest reserve.

Object.

The object of the proposed Honolulu Watershed forest reserve is to protect the water sources, both surface and artesian, on which the city of Honolulu has to depend for its domestic supply. With rapidly increasing population the time is not far distant when every drop of water that can be developed in the vicinity of Honolulu will be needed. By the setting apart of this catchment area as a forest reserve, better control can be exercised over it and more effective measures taken to protect and preserve thereon the cover of native vegetation so necessary in Hawaii on a watershed that is to be made to do its full duty.

Present Sources of Supply.

The more important of the present sources of Honolulu's supply are the springs and streams in Kalihi, Nuuanu, Pauoa, Makiki, Manoa and Palolo valleys, and the artesian wells that are scattered from Diamond Head to Moanalua.

It is unnecessary here to go into detail as to how the streams are diverted. Sufficient to say that the water that flows from the mountains back of this city, either on the surface or in the artesian strata, is the natural, and unless water be brought from a considerable distance—as from valleys in the Koolau range—the only available source of supply. It follows, as has repeatedly and for many years been pointed out by many persons, that greater care should be given the Honolulu watershed. The setting apart of this area as a forest reserve is a step toward the adequate protection and conservation of this area.

Under Section 565 of the Revised Laws of Hawaii (a law based on one enacted in 1860), the superintendent of public works has the right to take and use for the Territory any land and water needed for water works purposes "on the southern and western slopes of the Konahuanui range * * * between Palolo and Kalihi valleys." Under this law the upper part of Nuuanu valley has for many years been held as a water reserve, various pieces of private land having been acquired from time to time to round out the government holdings. The Makiki Valley water reserve was taken over by the government under the same law. It has been so held since 1881.

Of the other valleys Kalihi and Pauoa are for the most part in private ownership. A fair percentage of the mountain slopes at the head of Manoa fortunately still vest in the government, and, since the recent acquisition of the area around and including the Palolo crater, the same can be said of Palolo valley. Altogether,

government land makes up 72 per cent. of the total area of the proposed reserve.

Tantalus Forest and Makiki Park.

In addition to the valley heads and the slopes of the backbone ridge of the island, there have also been included in the proposed reserve the Tantalus forest and the Makiki park. The latter includes the Makiki water reserve. This park was set apart by a proclamation by the governor, issued in compliance with a request contained in House concurrent resolution No. 18 of the legislature of 1911. The upper part of the valley contains springs that form a part of the city's water supply. The slopes above them need to be guarded from contamination. Lower down a part of the valley is now the site of an experiment garden of the Division of Forestry, where plants of economic importance new to the Territory are started and propagated for distribution. The management of the Makiki park as regards forest work was officially turned over to the Board of Agriculture and Forestry by the superintendent of public works, in July, 1912, but this in no way affected the control or administration of the water works in that valley, any more than setting apart the proposed forest reserve will interfere with the operations of the bureau of water works in that valley or in Nuuanu.

The Tantalus forest, as all old residents of Honolulu know, was planted by the local government between the early 80's and 1898 at a very considerable outlay of time and money. A considerable portion of this forest was subsequently discovered to be on privately-owned land. In 1907, as a part of a land exchange, the Territory re-acquired possession of this tract, Kalawahine. The Tantalus forest has for several years now been looked after by the Board of Agriculture and Forestry, although still vesting in the Land Office. One reason for including it in the proposed forest reserve is that it may, without any question, be brought under the full jurisdiction of the Board of Agriculture and Forestry.

The Boundary.

Starting on the Ewa ridge of Kalihi valley, the boundary of the proposed Honolulu Watershed forest reserve follows the makai line of two government tracts, a remnant and the land of Kaloaloa; thence it runs across the heads of two smaller gulches on the lands of Kamanaiki and Palama, past the head of Waolani valley above the Country Club, to and across Nuuanu valley on the makai line of the main Nuuanu Valley water reserve and up the east wall of Nuuanu to the Pacific Heights ridge on the line between the government and the grazing land owned by the Dowsett Company. Then makai, along the ridge, toward Pacific Heights to a point opposite the west mauka corner of the land of Kalawahine, across Pauoa to the same, and makai along the

boundary of Kalawahine to the main Tantalus road across the forest and along the same and the upper boundary of the Makiki homestead lots; thence on the makai boundary of the Makiki park around the Makiki valley to the summit of Sugar Loaf and down the slope into Manoa; thence around Manoa valley at the base of the steep pali and following the boundary of the government land at the head of the valley to the Palolo ridge; down the same to the makai side of a small piece of government forest called Pukele, and thence across Palolo valley on the mauka boundary of Wailupe and of lot 13 of the Palolo homesteads. Returning, the proposed boundary follows up the Waio Mao-Waialae ridge to the backbone ridge of the island and then west along it to the lateral ridge separating Kalihi and Kahauiki, down which it runs to the point of beginning.

Considerable private land is included in this reserve, some of it unavoidably, some purposely, as in Palolo valley, where it was thought best to make the limits of the reserve take in certain possible reservoir sites that it may some time be advisable for the city to develop. As with other Hawaiian forest reserves, the fact that these private lands are included within the boundary is to be taken merely as a recommendation as to the line which this Board thinks ought to be the permanent boundary of the forest. Only the land owned by the government, of course, can actually be set apart.

Accompanying this report is the technical description of boundary prepared by the Government Survey Office as C. S. F. No. 2429.

Recommendation.

For the reasons above set forth I do now recommend that the Board approve this project and request the governor to create the Honolulu forest reserve and to set apart in accordance with law and custom, as portions thereof, the government lands within its boundary.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

Modification of Boundary, Molokaa Forest Reserve, Kauai.

Honolulu, June 16, 1913.

Gentlemen:—I have to recommend a change of boundary in the Molokaa forest reserve, Kauai, more particularly in that portion which lies in what is now known as the district of Kawaihau. The change will result in the elimination of 83 acres of open land and the reduction of the total area of the reserve from 5670 acres to 5587 acres. Seventy-one acres is government land; the re-

mainder is in private ownership. The section in question lies between a prominent spur just to the west of the old Lindsay place and the Kaluua stream. The old and the new forest lines are shown on the accompanying blueprint.

Reasons for the Change.

When the Moloaa forest reserve was laid out, in running the forest line between fixed points there was included within its limits some 80 acres of grazing land. With the exception of one small grove of trees and some pali, this area is open grass land, of more value for grazing than for forest, especially in view of the growing demand for pasturage on Kauai.

As it is not strictly needed as a part of the forest reserve, my judgment is that the area should be taken out and leased.

When on Kauai during the summer of 1912 I went over the land with the idea of this modification in mind. Last month I again visited Moloaa and with the assistance of Mr. S. W. Tay of the Government Survey Office changed the location of the line on the ground. By moving one forest reserve monument up the ridge 800 feet, the line is shifted sufficiently to exclude the grazing area.

Fencing.

The remainder of government land lying below the forest reserve was leased in October, 1912, to Mr. C. A. Rice. One of the provisions of the lease is that a fence shall be built on the forest line within a year. It is partly in order to make provision for having this fence properly located on the permanent forest boundary that the change of location is brought up at this time. With other arrangements now pending, it is expected that practically all of the remainder of the lower boundary of the Moloaa forest reserve will be fenced in the near future. It is highly desirable that this work be done, for trespass by cattle has been going on at Moloaa for a long time, much to the detriment of the mantle of vegetation on the slopes.

Description.

Owing to changes of name and boundary in the geographic districts on Kauai, the Survey Office has prepared a revised description of the whole line of the Moloaa forest reserve. This description, C. S. F. No. 2431, accompanies this report.

Recommendation.

For the reasons, then, that the area proposed to be excluded appears properly to be grazing rather than forest land; that it can be spared from the reserve; and that the adjustment of the line will facilitate the construction of a permanent forest fence, I do now recommend that the Board approve the proposed modification of boundary and call upon the governor to make the required change, as provided by law.

[While this project was being considered in committee it appeared desirable to make a further slight modification of the boundary. This matter was covered by a supplementary report, the essential paragraphs of which are as follows:]

Supplementary Report on Moloaa Forest Reserve.

Honolulu, August 30, 1913.

Gentlemen:—Under the date of June 16, 1913, I submitted a report recommending a change of boundary in the Moloaa forest reserve, Kauai, and desire now, before the matter is acted on by the committee on forestry, to suggest a further slight change in that reserve whereby there would be added a remnant of about 40 acres, the long narrow triangle of government land lying to the south of grant No. 549 to Ed. Rouxel, between the old Lindsay place and Aliomanu gulch.

It was expected at first that this area would be included in the grazing lease to Mr. C. A. Rice, but as it was not continuous with the remainder of his leasehold he did not take it.

The reasons for including it in the forest reserve are that as a detached remnant this small area is of practically no use to the government for grazing; that it is the same character as the land just above, and more particularly because a fence can be built on its lower or makai edge much more easily than on its upper side, the present forest boundary. A rocky section at best, it has been found on closer examination of the ground by Mr. Rice, a prospective bidder on the proposed fencing work, that the cost of post-hole digging would be materially less on the lower line. Mr. Tucker, the land commissioner, has no objection to the inclusion of this remnant in the reserve. I recommend that it be taken in.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

More than 3000 small logging operators now buy national forest timber; at least 25,000 persons, settlers, miners, stockmen and others obtain timber from Uncle Sam's big woodlot for their own use free of charge.

The forests of Corsica, the little island upon which Napoleon was born, are managed by the French government. They produce lumber, firewood and turpentine, and all parts of the tree are far more closely utilized than in America.

Two million trees will be planted on the national forests in Utah, Nevada, and southern Idaho during 1914.

DIVISION OF HYDROGRAPHY.

October 3, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of September, 1913, is submitted:

DROUGHT.

Data received from all islands except Hawaii show practically all streams to have the lowest discharge recorded since the inauguration of the hydrographic work. On Oahu the city water supply has reached a low point that will necessitate further restrictions in the use of water unless considerable rainfall occurs within the next few days. All streams on Oahu are at minimum discharges except in the case of the Waiahole stream, the discharge of which has been steadily increased by the underground water developed by the Waiahole tunnel. The north and south branches of the Kāukōnahua, which supply Schofield Barracks and the Wahiawa Water Company's reservoir respectively, have dropped below all known or estimated records. A measurement of the south fork on September 24 showed a discharge of but .74 of a million gallons per day, while on October 1 the north fork discharge totaled .96 million gallons per day.

On Maui the ditches of both East and West Maui are below all known records, while on Kauai the same condition occurs in a lesser percentage of ditches. Insufficient rainfall data have been received to make a comparison of the rainfall and run-off at this time.

METHODS OF INVESTIGATION.

There are two methods, or plans, of procedure under which the hydrographic investigation of this Territory may be carried forward with the funds available. One method consists in covering a large amount of territory with a meager or limited amount of work and equipment. The second method is to concentrate equipment and operations at those localities in which the work seems most immediately needed and, as soon as the necessary equipment has been established and the investigation put in as nearly a self-operating basis as possible, then to take up the work at other localities in the order of its importance in relation to the utilization, operation and development of water usage.

Previous to August, 1912, the first-named method was adopted by the engineers in charge of this work. An effort was made to obtain at least a little information of a general nature relative to all perennial streams, ditches, pumping plants, rainfall, etc., on

the islands of Kauai, Oahu, Maui and Hawaii. Considering the limited funds available, a remarkable amount of data of a general nature was collected and has been published in Water Supply Paper No. 318 of the U. S. Geological Survey. While the data published furnish a considerable amount of general information relative to the water supply of the Territory, it does not go far enough to be of high engineering and economic value to those interested in the actual utilization of the sources of supply of irrigation, power and other hydraulic projects.

The economic utilization of Hawaii's natural water supply is one of the most important factors in the agriculture of the Territory, and one which calls for intense methods of investigation instead of the superficial or general methods adopted in the past. The investigation of every perennial stream, spring, or other source of water supply should include the following:

1. At least 15 years' continuous gauge height records. These records should be obtained by automatic registers which give a continuous record and which cannot make a mistake or falsify records, as is frequently the case in man-read and recorded gauge heights.
2. Sufficient measurements by weir or current meter to develop and maintain rating tables of discharge which may be applied to the recorded gauge heights, and which will give the mean or average discharge for every day in the year, as well as the maximum flood discharge and the minimum discharge.
3. Sufficient rainfall stations in the catchment areas of the streams to enable the relation of the rainfall to run-off to be worked out, if possible.
4. A careful study of the topographic and geologic features, the vegetation, forestation and erosive features of the catchment area in reference to possible coöperative work with forestry or other conservation procedure.
5. An examination and investigation of all diversions from the stream and its present utilization.
6. An investigation covering the possible utilization of any waste water, flood or otherwise, which might be economically utilized by diversion or storage.
7. An investigation of evaporation losses and of the amount of water utilized in plant transpiration and growth, or of, as it is commonly known, the water duty for various crops under various conditions of soil, location, etc.

The first four operations are the only ones which strictly apply to hydrographic investigation work, but as the hydrographic survey is a necessary preliminary step toward the last three investigations named, the two phases of the work should be kept in view and should be considered in conjunction.

The first step necessary for this work is the installation of the

proper gauge height recording equipment, as on this part of the investigation depend all further steps.

Acts 56 and 57 of the 1913 legislature have made the intensive study of streams and other sources of water supply in limited areas possible, and it is believed that this method of procedure should be followed in the future. This method has been inaugurated in parts of the islands of Kauai, Oahu and Maui, and by December 31, 1913, twelve of the largest sources of supply on Kauai, six on Oahu and sixteen of the largest streams on Maui will be equipped with automatic registers, and will be ready for further steps of the investigating work. In selecting these streams those which are of the greatest economic value, or which may be utilized to supply water where crops are now suffering for lack of it, have been given preference. Should the present supply of funds continue to be available, it is estimated that within eight years all sources of supply will be under investigation; installation and construction work will be completed, and funds will be available to take up the features of investigations relative to utilization and duty. Pending the installation of clock register gauges, the practice of obtaining staff gauge readings by observers will be continued on those streams that are now under observation.

HYDROGRAPHIC RECORDS AND DATA.

From past experience it has been found best to work up records and data of perennial streams in annual units, and to publish these records and data for periods covering calendar years. Special investigations of seepage losses, reconnaissances for small domestic or power investigations, etc., may be made and completed within a shorter period of time, but investigations of perennial streams of sufficient importance to be considered in connection with a general hydrographic investigation are best reported annually. For this reason monthly reports from this division are necessarily of a routine nature, and it is much more difficult to convey information regarding the results to be obtained and the ends being worked for, than in the case of other phases of governmental work.

The following is a brief report of operations on the islands of Kauai, Oahu and Maui:

Kauai.

Mr. Hardy, assisted by Mr. Horner, visited 30 stream-gauging stations and 21 rain gauges, and made two measurements. Four gauging stations were discontinued on the Kekaha, Waimea and Poowaiomahaihai ditches as having served their purpose. About twelve miles of trail in the Lumahai, Hanalei, Wainiha and Kalihiwai valleys were constructed to reach suitable locations for the new Stevens clock registers which are to be installed in October.

Oahu.

On Oahu Mr. Dort and Mr. White visited 37 stream-gauging stations and four rain-gauging stations. Twenty-two regular stream measurements and one miscellaneous measurement were made. The new Kalihi clock register station was complemented by a footbridge for flood measurements. On September 12 a measurement was made of the water developed in the north portal of the Waiahole Water Company tunnel which showed a discharge of 20.6 million gallons per 24 hours.

Maui.

Mr. Bailey and Mr. Christiansen visited 48 stream-gauging stations, and made three measurements at regular stream-gauging stations and two miscellaneous measurements. During the month four new clock register stations were completed on the Kailua, Nailililihaele, Waikamoi and Haipuaena streams on East Maui. An inspection and reconnaissance trip was made by Mr. Larrison and Mr. Bailey from Kailua around East Maui, via Hana, Kipahulu, Kaupo and Haleakala to investigate water conditions. Future station sites on all streams east of Keanae and between Hana and Kaupo were tentatively selected. It is believed that about 20 million gallons of water per day are now running to waste in dry weather between Hana and Kaupo, which could be utilized at Hana, Kipahulu and Kaupo at reasonable construction and maintenance costs. A small part of this water is now being used by the Kipahulu mill and for fluming purposes.

Ten ditch-gauging stations were discontinued during the month.

Kona Investigation, Hawaii.

Mr. Kimble, assisted by Mr. Wassman, has completed all possible storage sites but three in North Kona, and has completed a clock register weir station on the Kiilae stream in South Kona. Mr. Kimble reports that all field work, including the population and present water supply census, will be completed in November, leaving but routine rain-gauge reading and clock-register reading to be done.

Very respectfully,

G. K. LARRISON,
Superintendent of Hydrography.

Ammonia bombs are being tried out on some of the national forests for the purpose of extinguishing forest fires. They are said to have worked well in the case of brush fires where the fire-fighters find difficulty in getting near enough to the burning area to beat out the flames. Each bomb exploded will extinguish fire in a circle of about five yards in diameter.

Switzerland has four coöperative associations for the growing and marketing of forest products.

THE KALO IN HAWAII (IV).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

VARIETIES (Continued).

52. **HIWA.** This name refers to the dark color of the plant and its suitability for offering to the gods. It is associated with *puna hiwa*. A cultivated kalo, never growing wild, raised in both irrigated and unirrigated fields. The corm is of average size, whitish within. The foliage is very dark green, with a grayish or blackish suffusion. The *poi* and *lua'u* are good; the plant is suitable for medicinal purposes. According to some natives this variety is called *Hiwa* on Hawaii, and *Uahi-a-Pele* on Oahu and Maui.

53. **HOENE.** This word means a syringe, and is applied to this kalo because shaped pieces of its hard and slippery corm were used medicinally as suppositories. It was cultivated extensively, in unirrigated fields, for its medicinal uses, and was never used for food. Much was formerly raised in Palama, Oahu. The corm is dark colored; the foliage has no distinctive markings.

54. **HOKEO.**

55. **HOOLE NAWAO.** "Wao" means in the wild, or near the forest; "*hoole*" means denial; and the name refers to an ancient legend, wherein certain natives denied that this kalo grew up in the forests, although it really did. Usually wild, rarely cultivated; if so, in *lo'i*. Cultivated formerly in Manoa, Oahu; grows wild on Maui and Hawaii. The corm is dark gray within, and of average size. According to the natives the wild corms are much larger than those of cultivated plants. The roots of the corm are conspicuously reddish. This variety, like certain others, sends out subterranean suckers or offshoots, so that it spreads out and thus perpetuates itself. The foliage is green, with reddish or purplish venation, *piko*, and petioles. The *lua'u* is excellent; the plant is not considered suitable for medicine, or for offering to the gods.

56. **HUALANI.**

57. **HUA MOA.**

58. **HULI PU LOA.** A kalo known in Kohala, Hawaii.

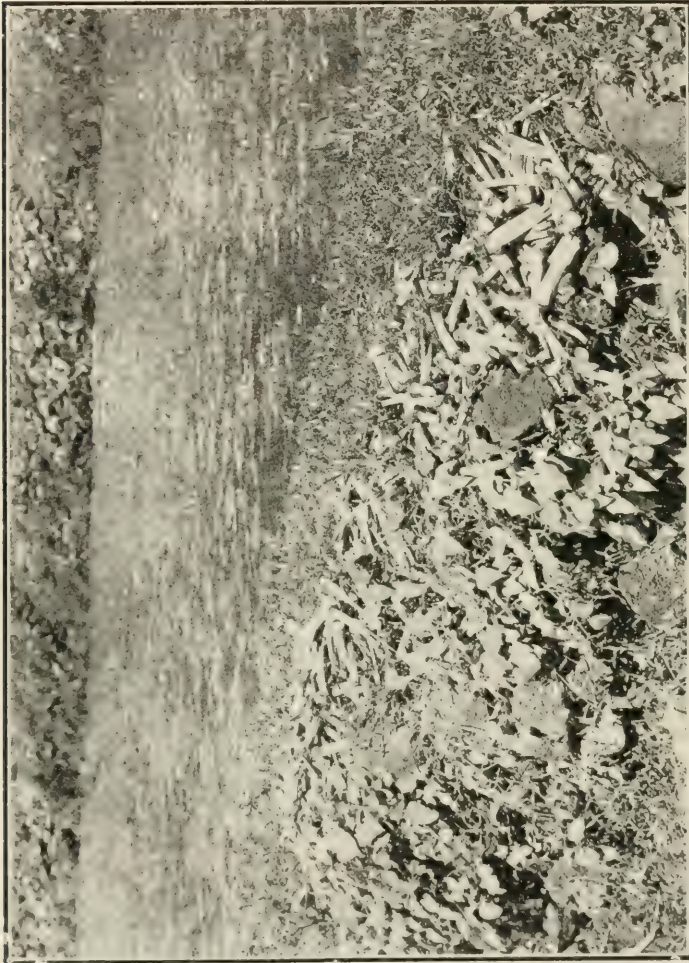
59. **IAIA ILIA.** Probably a synonym for *Iheiheilie* q. v.

60. **IEIE.** The foliage of this kalo is dark green and glossy, somewhat resembling that of the *icic zinc*. This variety is sometimes erroneously called *Kumu ulaula*. It is a cultivated kalo, raised in unirrigated patches near the edges of the woodlands. Raised extensively on Hawaii. The petioles are very dark purplish, more so than other varieties.

61. **IHEIHEILIE.** A Hawaiian kalo, grown both in *lo'i* and

unirrigated patches, not raised on Oahu. The foliage is of the usual clear green color; the corm is somewhat pinkish within.

62. II. So-called because of a fanciful resemblance to the fern *pala ii* (q. v.). *Pala* means luscious or fully mature, and this variety is so called because its corms are unusually palatable.



HARVESTED FIELD; HULI.

Note the solid stone embankment; the empty field; the *huli* cut for planting.

It is cultivated, never growing wild. Raised in *lo'i* and unirrigated fields, on Hawaii and Oahu. The leaves are dark green; when the plant grows rankly, the petioles are said to attain a height greater than of a man. The leaf-blade greatly resembles that of the *Apurcaii*. The corm is of average size, light gray within, and prized because of its suitability for making the pud-

ding *kulolo*, because of its non-acridity. The corms command a much higher price than those of other varieties, because of their scarcity and choice quality. The plant is suitable for all purposes, save as offering to the gods.

63. IPUOLONO. "The cup of Lono," the sacred cup. According to some authorities this name is given to it only on Oahu, and on Hawaii it is called *Wehiwa* or *We wehiwa*. There are two sub-varieties, *keokeo* and *ulaula*.

64. IPUOLONO KEOKEO. A common variety, cultivated in *lo'i* and unirrigated fields, not occurring wild. Typical localities are Pauoa, Oahu, and Kohala and Kau, Hawaii. The corm is gray within; sometimes attains large size, although usually small. It matures in one year, and can remain in the ground for a much longer time without deterioration. The Chinese planters pull it in from nine to eleven months, which is too soon. The leaf is dark green, and somewhat curved, like a cabbage leaf, so that it catches rain. This *kalo* is suitable for all purposes.

65. IPUOLONO ULAULA. Similar to the above, except that the corm is pinkish or reddish, instead of gray.

66. KA'I. A well-known *kalo*; also called *Welo-welola* and *Ala* (q. v.). The latter name is applied when the *kalo* is cooked in an oven, and emits pleasant odors. There are several sub-varieties.

67. KAI AWEUWEU. See *Aweoweo*.

68. KAI ELEELE. Similar in all respects to *Kai kea*, except that the corm when cooked is dark gray (*clecle*) instead of light yellowish (*mele mele*).

69. KAI KEA. Raised in unirrigated fields on Hawaii, in *lo'i* on Oahu and Kauai. The corm is yellowish, translucent, or amber-like (*melemele*); texture firm and tough. The foliage is clear green. The *poi* is very good, and was formerly much esteemed by the chiefs, because of its amber-like translucency. Its production has been abandoned since the Chinese occupancy of the *kalo* lands. This *kalo* requires 8-12 months for maturity.

70. KAI KEOKEO. Synonym for *Kai kea*.

71. KA-I KOI. By some natives this is considered synonymous with *Ka-i clecle*; according to others it is a distinct variety. It is a cultivated *kalo*, never occurring wild, and is grown in *lo'i* and in unirrigated fields. In olden times the Ewa region, on Oahu, was famed for the excellent *kalo* of this variety that it produced, and "*Ka kai o Ewa*" is still a current phrase. The raw corm is whitish within; upon cooking it turns dark gray. It is firm and close-textured, and requires much labor to pound. The foliage is dark green. The *poi* is excellent, is dark gray or light bluish when fresh, and becomes darker with age.

72. KAINELE UEUE.

73. KALALAMA MAKAIH.

74. KALALAU.



KALO NEARLY MATURE.

The plants crowd one another as they mature, and the leaves form an almost unbroken canopy. Note bananas in upper left-hand corner.

75. KALANI PILL.

76. KAMAU.

77. KANELII.

78. KAXIO. The name refers to the spotted or variegated (*onio*) leaves. This kalo was formerly abundant; it is now practically extinct. The corm is light gray within; it matures in one year. The foliage is dark green mottled with purplish; the

petiole is striped with purplish. This variety is good for poi, for *lau'u* and for medicine.

79. KAPALILI.

80. KAPUUKONANE.

81. KAWALE UAU.

82. KAWELO.

83. KOA'E. So called because it is striped or spotted; fancifully likened to the *Koa'e* bird (tropic bird). There are three sub-varieties—*kokeo*, *elele*, and *ulaula*.

84. KOA'E KEOKEO. A kalo cultivated in *lo'i*, formerly abundant, now rare. The corm is light gray within. The foliage is mottled, and the petiole is striped with purplish. Good for *poi* and *lua'u*; not used medicinally.

85. KOA'E ELEELE. Similar to *Koa'e keokeo*, save that the leaf is very dark green, the petiole almost blackish.

86. KOA'E ULA ULA. Similar to *Koa'e keokeo*, save that the leaf blade and petiole are suffused with reddish.

87. KOHIKU.

88. KOOKA.

89. KUKAI IOLE. Name means "mouse dung." Raised in the Hilo region, Hawaii.

90. KUMAKA'U. The natives tell a marvelous tale regarding this kalo. It is now extinct, but in ancient times was raised in certain *lo'i* at Pahaalele, near Waihee, Maui. The corms were cylindrical in shape and attained prodigious size, sometimes two feet thick and six feet long! They were edible, and were also used as rollers, in the process of launching canoes!

97. KUMU. This name was applied originally to a certain red fish, and was later given to this kalo because its corms were red in color like the fish. The kalo is well known, and there are numerous sub-varieties.

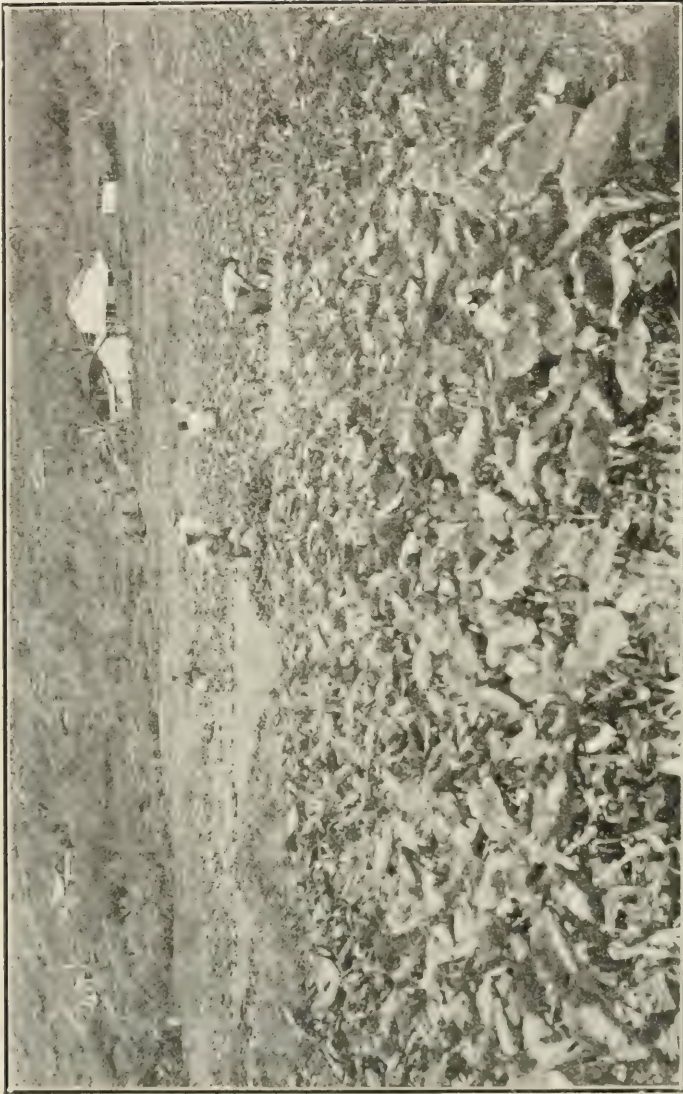
92. KUMU KEA, or KUMU KEOKEO. Similar to *Kumu ulaula* except that the foliage is clear green, not suffused with reddish.

93. KUMU PONI. Similar to *Kumu ulaula*, save that the foliage is very dark, the bases of the petioles being blackish.

94. KUMU ULAULA. Quite rare. The corms are large, and decidedly red within. The foliage suffused with reddish. The *poi* is very choice and is superior to *Piialii* in color. Both the fish *Kumu* and this kalo were considered very suitable for offering to the gods as propitiation for *he'e'a* (non-fulfillment of vows). In 1908 Mr. L. C. Lyman of Hilo sent corms of this kalo to the U. S. Department of Agriculture.

95. KUMU WELOWELOLA. Probably another name for *Kumu ulaula*. So called because it grows best, in native belief, when planted at sunset time, on a day when the western sky is red. If this precaution is observed, the corms upon maturity will be of the desired red color.

96. KUOHO.



MATURE KALO—HARVESTING.

This land is leased and operated by Japanese and Chinese. Note the terraced fields; the workmen pulling the corms; the piles of corms upon the banks; the kalo leaves and other debris floating on the shallow water; the valley side; the Chinese white-washed cottages.

- 97. KUPALA.
- 98. LAI O KONA.
- 99. LAPA.
- 100. LAUAPE. Means "leaf like the ape."
- 101. LAUKAPAHILI.
- 102. LAUKONA.
- 103. LAULELE.

104. LAULOA. A well-known kalo. Name means large or long leaf. Several sub-varieties.

105. LAULOA HAELEELE. Raised in *lo'i* and unirrigated fields. When grown in unirrigated patches, as on Hawaii, the petioles are not striped and it is then called *Palakea*. On Oahu it is grown commonly in *lo'i*. The corm is white within. This kalo is considered suitable for medicine, and for offering to the gods.

106. LAULOAHAKEOKEO. Also called *Lauloakeokeo*.

107. LAULOA HAULIULI. The corm is light colored when raw, but upon cooking becomes dark-colored and beautifully mealy. It is very suitable for baking or frying.

108. LAULOA MANINI. According to native tradition this kalo is not at all suitable for presentation to the gods (*au makua*) because it is associated with the idea of death, and anything having these associations is not suitable.

109. LAULOA ONIONIO. A *lo'i kalo*, with white corm and striped petioles. The *poi* is good, and resembles that of *Apuwai*. It is soft and easily pounded, but not mushy, and not hard like that of *Ka'i*. This kalo matures in one year.

110. LAULOA ULAULA. The corms of this *lau loa* are distinctly pinkish within.

111. LAU NUI. Means "large leaf." Varietal name in use on Oahu.

112. LEHUA. A well-known kalo (grown throughout the Islands, and divided into numerous sub-varieties. Mr. F. A. Clowes of Hilo sent corms to the U. S. Department of Agriculture, February, 1911, and wrote as follows: "The term 'Royal Taro' should, I believe, be applied to a class of taros and not to any one variety. All the dark-fleshed taros were, I am told, taboo to the common people, and were only eaten by and grown for the chiefs. The Lehuas, of which there are two, the black or Eleele, and the white or Keokeo, are only two of this class." (Bur. Plant Ind. Bull. 233, p. 38.)

113. LEHUA AOLA. A sub-varietal name known on Oahu.

114. LEHUA ELEELE. "Royal Black Taro." "The distinctive mark of this Lehua is the dark purple ring at the junction of the corm and the leaf-stalk" (Clowes).

115. LEHUA HAULIULI.

116. LEHUA KEOKEO. "Royal White Taro." The uncooked corm is purple, apparently non-acrid; upon cooking it turns pink. The sprouts from the corm are also purple. The corms mature in about eight months.

117. LEHUA KUIKAWAO. This name refers to its habits of growing wild in swampy places near the forest. It is also cultivated in *lo'i*, and was formerly abundant in Hilo, Honolulu and other places. The corms are red, like those of *Piialii*. The foliage is suffused with reddish; the petioles frequently attain the length of three feet. The *poi* and *lua'u* are excellent.

118. LEHUA ONIONIO. Corm and poi similar to *Piialii*. The foliage also resembles that of *Piialii*, save that the leaf-blade of *Piialii* is curled or wavy along the margin, while that of *lehua ulaula* is open and expanded, without waviness.

120. LELE.

121. LEO.

122. LILI LILI MOLENA ELEELE.

123. LILI LIHI MOLENA KEOKEO.

124. LIKO LEHUA.

125. LILI LEHUA.

126. LOHA.

127. LOLA. So called because of the wrinkled leaf-blade. Cultivated both in *lo'i* and unirrigated field; formerly abundant, but now uncommon. The corm is dark red or purplish within. The leaf-blades are spotted with purplish, and the petioles are striped with the same color. The petioles are often very long (+5 feet), and are probably the longest of any Hawaiian *kalo*. The *poi* and *lua'u* are excellent; the plant is not used medicinally.

128. MAHAHA. A wild *kalo*, growing in wet places near the edge of the woods; never cultivated in *lo'i*. There are two sub-varieties.

129. MAHAHA KEOKEO. By some natives considered synonymous with *Ahe* (q. v.). The corm is white within; the *poi* is of very poor quality; in fact, the adjective *mahaha* is applied to *kalo* that is hard and unfit for poi-making (*loli-loli*). The petioles are reddish or purple. The *lua'u* is excellent.

130. MAHAHA ULAULA. Similar to *Mahana keokeo* save that the corm is pink within.

131. MAHAU. Synonym for *Mana*, q. v.

132. MAHAKEO. One of the *kalo* used in the preparation of native medicines.

133. MAHI.

134. MAKAIOLE. Varietal name used on Oahu. Means "mouse eye."

135. MAKAOPIO. Cultivated on Hawaii, Maui and Oahu; both wet and dry land; never wild. The corm is reddish without; its interior is gray. The leaf is dark green, the petiole very dark purple. The *lua'u* is good; the corm is excellent steamed, and as *poi*. This *kalo* is similar to *Ha'okca*.

136. MAKAAU. Varietal name used on Hawaii, in the Hilo region.

137. MAKEA.

138. *Makohi*. Varietal name, synonymous with *Mokohi* q. v.

139. MAKOKO.

140. MAKOLE.

141. MAKUKU (Kalo o Mahuku). A *kalo* famous at Nahiku, Maui, in olden times, and said to have been used for rollers for canoes.

142. MANANE. Varietal name used on Oahu.
143. MAMANU. Varietal name used on Oahu.
144. MANAUEA. See *Aweoweo*.
145. MANA. A large and well-known group of kalo varieties, as follows:
 146. MANA ELEELE.
 147. MANA HAULAULA. See *Ala*.
 148. MANA HUA.
 149. MANA IEA.
 150. MANA KEA.
 151. MANA PIPIKA.
 152. MANA ULAULA. The petioles of this kalo are decidedly reddish. The interior of the corm is white; upon cooking it becomes bright yellow.
 153. MANAULU.
 154. MANA WAI. Resembles *Apuwai*. Corm is white.
 155. MANA WEA. A wild kalo, growing in the mountains. Perhaps a synonym for *Aweoweo*.

Contrary to popular belief, forest fires seldom travel more than two or three miles an hour. Even in extreme cases it is questionable whether they burn at a rate of more than six to ten miles an hour.

Uncle Sam's forest rangers require that permanent camp sites within the forests shall be kept in sanitary condition. The ubiquitous tin can must be buried, and waste paper burned when a camp is left.

Makers of small hickory handles for hammers, chisels, and the like, are now trying to use the waste from mills which make hickory spokes and pick and ax handles.

Four new state forests have recently been added to those in Hawaii, making 27 in all, with an aggregate of 683,101 acres. Of this amount, 67 per cent. belongs to the territory, the rest being private land administered by the territorial forest officers.—Forest Notes for September.

At the national conservation congress to be held in Washington, November 18-20, the subject of forestry will be handled by a main committee, with subcommittees which will report on federal and state forest policies, forest taxation, fires, lumbering, planting, utilization, forest schools and scientific forest investigations.

Over twelve thousand dollars, ten per cent. of national forest receipts in Wyoming during the past fiscal year, is available for expenditure by the secretary of agriculture on roads and trails within the state, according to the report of the U. S. forest service.

FOREST INSECT RAVAGES STOPPED.

By a prompt campaign against a flourishing colony of bark beetles on the Ochoco national forest in central Oregon, the government is eliminating a danger which threatened to destroy millions of feet of timber.

Some authorities claim that the amount of timber killed each year by insects is equaled only by the annual loss from forest fires. Among the most destructive of these insect enemies are the bark beetles, one of which, the mountain pine beetle, is responsible for most of the damage on the Ochoco forest. This deadly little beetle is less than a quarter of an inch in length, but bears the ponderous scientific name of *Dendroctonus monticolae* Hopk., which, being interpreted, signifies killer of the mountain pine tree, discovered by Hopkins.

Its methods of operation are interesting. The mature beetle bores through the bark of the tree and excavates a gallery in the inner living bark and in the outer surface of the wood in which it lays its eggs. When hatched each young larva, or beetle-grub, channels into this growing portion of the trunk, feeding upon the inner bark. When full grown the larva, after passing through a dormant, or pupal, stage becomes a beetle. This beetle then drills out through the bark in July, and, emerging into the world, seeks a fresh tree and starts a new generation. With this "chain-letter" method, it soon infests a large area. The galleries or channels of the larvae girdle the tree and kill it, and the beetle's presence is usually discovered, as it was in the Ochoco forest, by a patch of red-brown dead pine trees in the midst of a mountain-side of green.

In fighting this forest scourge, the method recommended by the Bureau of Entomology is followed. The simple removal of the bark of infested trees between October and July, while the larvae are still in the tree, is sufficient to kill them. The lumber may then be sold while it is yet sound. On the Ochoco forest, however, there was no market, and the forest officers found that the cheaper and more effective method of control was to cut the trees and burn them before the new broods of beetles could emerge. In 1912 the infestation was given a decided check by the cutting of 3500 trees. This summer the attack on the insects was resumed with renewed vigor, and 42 laborers, in charge of a forest officer, cut more than 40,000 trees. As a result of these vigorous measures, the government apparently has the beetles under control.

BY AUTHORITY.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICT OF
HONOLULU, CITY AND COUNTY OF HONOLULU, ISLAND
OF OAHU, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby RECOMMEND and APPROVE as a forest reserve to be called the HONOLULU WATERSHED FOREST RESERVE, those certain pieces of government and privately owned land in the District of Honolulu, City and County of Honolulu, Island of Oahu, Territory of Hawaii, which may be described roughly as embracing the catchment area between Kalihi and Palolo Valleys back of Honolulu, and containing an area of 6950 acres, more or less, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department, marked Government Survey Reg. Maps Nos. 2293 and 2554 and "Honolulu Watershed Forest Reserve," and a description accompanying the same, numbered C.S.F. No. 2429, which said description now on file in said Survey Department is as follows:

HONOLULU WATERSHED FOREST RESERVE.

Including lands in the Palolo and Manoa Valleys, on the Makiki
and Tantalus Heights, and in the Nuuanu and Kalihi Valleys,
District of Honolulu, Island of Oahu.

C.S.F. 2429.

Beginning at a point at top of ridge between Waiaiao and Waialae Nui, the coördinates of said point referred to Government Survey Trig. Station "Rocky Hollow" on the ridge between Waiaiao and Kekio being 685.5 feet South and 2482.2 feet East, as shown on Government Survey Reg. Map No. 2293, and running by true azimuths:

1. 130° 00' 791.0 feet along Lot 12, Palolo Homesteads, to South corner of Lot 13;
2. Thence along and around Lot 13, Palolo Homesteads, by the following azimuths and distances:
 - (a) 218° 20' 128.0 feet to a rocky point on side of pali;
 - (b) 156° 20' 999.0 feet to XIII marked on large rock on edge of stream;
 - (c) Thence up along center of stream to + on rock in stream, the direct azimuth and distance being:
168° 05' 440.0 feet;
 - (d) 121° 10' 368.0 feet to top of ridge between Waiaiao and Kekio;
3. Thence down ridge between Waiaiao and Kekio along Lot 13, Palolo homesteads, the direct azimuth and distance being:
44° 30' 788.0 feet;
4. Thence still down ridge between Waiaiao and Kekio along Lots 12, 11 and 10, Palolo Homesteads, to Government Survey Trig. Sta. "Rocky Hollow," the direct azimuth and distance being:
33° 30' 1077.0 feet;
5. 99° 56' 656.5 feet across small valley and along Lot 18, Palolo Homesteads to a spike in bed-rock of stream and waterfall;
6. 95° 12' 239.4 feet along Lot 18, Palolo Homesteads, to corner of fence;

7. 136° 06' 1048.5 feet along land of Wailupe to a + on rock;
8. 136° 06' 1320.0 feet along land of Wailupe to top of ridge dividing Manoa and Palolo Valley;
9. Thence 4300 feet, more or less, along said ridge along Grant 161 to Wm. H. Rice & Company's and Grant 152 to Punahou School to the East corner of said Grant 152 at a place called Keanapoe;
10. Thence 2000 feet, more or less, down Keanapoe ridge along Grant 152 to Southeast corner of Grant 3619 to Helen Boyd;
11. 192° 15' 850.0 feet across mouth of Waiakeakua Valley and along Grant 3619;
12. 208° 30' 1010.0 feet along ridge along Grant 3619;
13. Thence 1000 feet, more or less, along ridge along Grant 116 to E. H. Rogers;
14. Thence 1600 feet, more or less, across Naniuapo Valley along Grant 116, L. C. A. 11029 and Grant 154 to E. H. Rogers to the top of Luaalaea ridge;
15. Thence down Luaalaea ridge to the Luaalaea Stream;
16. Thence down Luaalaea Stream to its junction with the Kahauiki Stream;
17. Thence 650 feet, more or less, across the land of Luaalaea to a large rock marked + at the East corner of Grant 200 to C. Nawaina;
18. Thence 100 feet, more or less, up along Waihi Stream;
19. Thence 280 feet, more or less, up along Waihi Stream;
20. Thence 130 feet, more or less, up along Waihi Stream;
21. Thence 210 feet, more or less, up along land of Waihi;
22. Thence 200 feet, more or less, along land of Waihi;
23. Thence 1660 feet, more or less, along land of Waihi to foot of pali;
24. Thence along foot of pali across the lands of Aihualama and Haukulu, Grant 204 to Kanoa and Kahiwalani, the land of Pu-kaumaomao, Grants 80 to S. P. Kalama and 473 to E. H. Rogers and part of the land of Puahuula;
25. Thence up pali to the South corner of Waterhouse Lot; said corner being 880 feet, more or less, Southeast of Government Survey Trig. Station "Kakea";
26. 141° 05' 248.5 feet along Waterhouse Lot;
27. 124° 55' 229.0 feet along Waterhouse Lot;
28. 150° 15' 88.4 feet along Waterhouse Lot;
29. 221° 15' 100.0 feet along U. S. Military Reservation;
30. 130° 30' 173.0 feet along U. S. Military Reservation;
31. 104° 52' 239.6 feet along U. S. Military Reservation;
32. 70° 34' 214.9 feet along U. S. Military Reservation;
33. 351° 00' 185.5 feet along U. S. Military Reservation;
34. 27° 27' 1059.0 feet along ridge along Government land to a pipe;
35. 63° 21' 764.0 feet along Government land to a pipe;
36. 47° 47' 1249.0 feet along Government land to a pipe;
37. 40° 58' 1363.0 feet along Government land to a pipe;
38. 51° 27' 543.8 feet along Lot 825, Makiki-Round Top Lots, to road;
39. 149° 47' 104.3 feet across road to the North corner of Lot 817, Makiki-Round Top Lots;
40. 84° 49' 437.9 feet along Lot 817, Makiki-Round Top Lots;
41. Thence along 50 foot road on a curve to the left with a radius of 203.7 feet for a distance of 208.9 feet, the direct azimuth and distance being: 346° 22' 30" 199.85 feet to a stake;
42. 47° 00' 50.0 feet across road to a stake at the North corner of Lot 814, Makiki Round Top Lots;
43. 92° 45' 179.4 feet along Lot 184, Makiki-Round Top Lots;
44. 101° 45' 50.0 feet across road;

45. 11° 45' 73.9 feet along West side of road;
46. Thence along road on a curve to the right with a radius of 450.0 feet to a point, the direct azimuth and distance being 21° 16' 148.8 feet;
47. Thence along road on a curve to the left with a radius of 350.0 feet to a point, the direct azimuth and distance being: 12° 27' 220.2 feet;
48. 354° 07' 185.0 feet along West side of road;
49. Thence along said road on a curve to the right with a radius of 40.0 feet to a point, the direct azimuth and distance being: 37° 30' 55 feet, more or less;
50. Thence along road on a curve to the left with a radius of 136.0 feet to a point, the direct azimuth and distance being: 50° 10' 148 feet, more or less;
51. 17° 20' 171.0 feet along Makiki Street;
52. Thence along Makiki Street on a curve to the right with a radius of 518.06 feet, for a distance of 125 feet, more or less;
53. Thence on a curve to the right with a radius of 8 feet, more or less;
54. 166° 17' 75 feet, more or less, along Makiki Drive;
55. Thence along Makiki Drive on a curve to the right with a radius of 462.0 feet, the direct azimuth and distance being: 181° 50' 286.4 feet;
56. 202° 31' 547.3 feet along Makiki Drive;
57. 107° 15' 50.2 feet across Makiki Drive to a stake;
58. 192° 00' 57.3 feet along Grant 5332 to F. K. Howard;
59. 112° 31' 281.6 feet along Grant 5332 to F. K. Howard;
60. Thence on a curve to the right within a radius of 195.0 feet, the direct azimuth and distance being: 78° 05' 116.1 feet;
61. 182° 56' 50.0 feet across Makiki Drive;
62. 92° 56' 101.6 feet along Makiki Drive;
63. 88° 42' 101.8 feet along Makiki Drive;
64. 87° 19' 38.0 feet along Makiki Drive;
65. Thence on a curve to the right with a radius of 20.0 feet, the direct azimuth and distance being: 134° 41' 29.4 feet;
66. 182° 02' 29.0 feet along Makiki Drive to the South corner of Lot 625, Makiki Heights Lots, the coördinates of said point referred to Government Survey Trig. Sta. "Makiki" being 179.6 feet South and 206.9 feet West;
- Thence along Makiki Heights Lots along edge of bluff;
67. 211° 38' 281.9 feet along Lot 625;
68. 280° 00' 60.0 feet along Lot 630;
69. 215° 00' 181.9 feet along Lot 630;
70. 176° 53' 226.4 feet along Lot 630;
71. 192° 51' 312.0 feet along Lot 531;
72. 198° 08' 198.2 feet along Lot 636;
73. 214° 45' 159.9 feet along Lot 638;
74. 209° 11' 134.8 feet along Lot 639;
75. 209° 30' 206.2 feet along Lot 648;
76. 172° 27' 130.2 feet along Lot 648;
77. 90° 00' 164.6 feet along Lot 648 to the Tantalus Drive;
78. Thence along Lot 648 on a curve to the right with a radius of 40.0 feet, the direct azimuth and distance being: 197° 30' 69.2 feet;
79. 92° 44' 229.3 feet along Lots 647 and 646;
80. 87° 32' 296.9 feet along Lots 646, 645, 644;
81. Thence along Lot 644 on a curve to the right with a radius of 68.7 feet, the direct azimuth and distance being: 117° 45' 69.0 feet;
82. 147° 59' 104.8 feet along Lot 644;

83. Thence across road to the North corner of Lot 643, the direct azimuth and distance being: 64° 02' 156.9 feet, said point being on the boundary of Makiki and Kalawahine;
84. 225° 12' 50 feet, more or less, across road;
85. Thence following along the mauka edge of the Tantalus Road to the middle of gulch, said point being on the boundary of Kalawahine and Kewalo;
86. Thence up the middle of said gulch along the land of Kewalo to the Northeast corner of said land;
87. 176° 15' 513.0 feet along land of Kewalo;
88. 160° 54' 1048.0 feet along the land of Kewalo deeded by the Territory of Hawaii to W. R. Castle to a point in Pauoa Valley;
89. Thence 1200 feet, more or less, to Government Survey Trig. Station "Pauoa";
90. Thence 3950 feet, more or less, up along ridge dividing Nuuanu and Pauoa Valleys to the East corner of land deeded to J. H. Wood;
91. Thence 3300 feet, more or less, along land deeded to J. H. Wood to junction of old and new Nuuanu Pali roads;
92. Thence along East side of old Nuuanu Pali Road to a pipe at the East corner of McIntyre Lot;
93. 141° 05' 446.1 feet along McIntyre Lot to a pipe;
94. 63° 32' 100.0 feet along McIntyre Lot to a pipe;
95. 141° 05' 297.4 feet along J. O. Carter Estate to a pipe;
96. 63° 32' 150.0 feet along J. O. Carter Estate to a pipe;
97. 141° 05' 1756.5 feet along J. O. Carter Estate and land deeded by Kamehameha III to Niniko to top of ridge;
98. 155° 30' 800.0 feet along ridge along Waolani to the head of Waolani Valley;
99. Thence 2200 feet, more or less, across the lands of Kapalama and Kamaikai to the East corner of Ouaua, L. C. A. 6450, Ap. 8;
100. 159° 09' 2450 feet along Ouaua to the Northeast corner of Ouaua, L. C. A. 6450, Ap. 8, to stream;
101. Thence 1200 feet, more or less, along stream along Kakuapalanu to East corner of L. C. A. 5011, Ap. 1;
102. 232° 10' 1080 feet along stream along Huea;
103. 164° 10' 2260 feet along Government land;
104. 140° 00' 950 feet along Government land to top of ridge;
105. Thence up along said ridge bounding Moanahua and Kalihi Valleys to the junction with the main Koolau Range;
105. Thence along the Watershed of the Koolau Range across the head of Kalihi Valley to the junction of the Kalihi and Nuuanu Valleys;
107. Thence along same across the head of Nuuanu Valley to the junction of the Nuuanu and Manoa Valleys at a peak called Kona-huanui;
108. Thence along same across the head of Manoa Valley to the junction of Manoa and Palolo Valleys at a peak called Mt. Olympus;
109. Thence along same across the head of Palolo Valley to the ridge bounding Palolo and Waialae Valleys;
110. Thence down said ridge to the point of beginning.
Area, 6950 Acres, more or less.

AND as provided by law, subject to the existing rights and leases, I do hereby SET APART as parts of the HONOLULU WATERSHED FOREST RESERVE those portions of the government lands in the Kalihi and Nuuanu Valleys, on Pacific, Makiki and Tantalus Heights, and in Manoa and Palolo Valleys, altogether an area of 5000 acres, more or less, that lie

within the metes and bounds of the above described HONOLULU WATER-SHED FOREST RESERVE.

(Seal)

IN WITNESS WHEREOF, I have hereunto
 * set my hand and caused the Great Seal of
 the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu, this 13th
 day of October, A. D. 1913.

E. A. MOTT-SMITH,
 Acting Governor of Hawaii.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICTS OF
 NORTH AND SOUTH KOHALA AND OF HAMAKUA, ISLAND
 AND COUNTY OF HAWAII, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby RECOMMEND and APPROVE as a forest reserve to be called the Kohala Mt. Forest Reserve, those certain pieces of government and privately owned land in the Districts of North and South Kohala and of Hamakua, Island and County of Hawaii, Territory of Hawaii, which may be described roughly as embracing the summit and upper slopes of the Kohala Mountain, and containing an area of 29,627 acres more or less, more particularly described by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked Government Survey Reg. Map No. 2037 and "Kohala Mt. Forest Reserve," and a description accompanying the same numbered C.S.F. No. 2432, which said description now on file in said Survey Department is as follows:

KOHALA MOUNTAIN FOREST RESERVE.

Including portions of the lands of Awini, Honokane, Pololu, Makanikahio 1 and 2, Waiapuka, Niulii, Makapala, Aamakao, Halawa, Halelua, Nunulu, Lamaloloa, Kaiholena, Kawaihae 1, Kawaihae 2, the ilis of Puukawaiwai-panoluukia-kapia, Pauahi, Momoualoe, Ouli, Lanikepu, Waikoloa, and Puukapu,

In the districts of North and South Kohala,
 and portions of the ahupuaa of Waipio, the ili of Lalakea and the ahupuaas of Kukuhihaele, Waikoeke, Kamoku, and Keaa,

In the District of Hamakua,
 Island of Hawaii.

Beginning at a point on the West edge of Pololu Pali, the true azimuth and distance of said point from the forest monument post set in on the boundary of the lands of Makanikahio and Waiapuka, being 280° 58' 672.0 feet, and the coördinates of said point of beginning referred to Government Survey Trig. Station "Kauhola" and 23,222.1 feet South and 8665.5 feet East, and the boundaries run by true azimuths:

1. 100° 58' 9392.6 feet crossing the lands of Makanikahio 1 and 2, Waiapuka, Niulii, Makapala, and Aamakao to a Forest Monument post set in by the gate of the Kohala Sugar Company's fence on the East side of Aamakao Gulch;
2. 77° 58' 8921.4 feet crossing the lands of Aamakao, Halawa, Halelua and Nunulu to the fence on the East side of the present Waimea-Halawa Road;

3. Thence along said fence, crossing the lands of Nunulu, Lamaloloa, and into Kaiholena, direct azimuth and distance being $9^{\circ} 8'$ 3997.0 feet;
4. Thence along said fence, crossing and along the land of Kaiholena to the land of Halawa, direct azimuth and distance being $271^{\circ} 25'$ 4240.0 feet;
5. Thence mauka along said fence, bounding Halawa, to the makai corner of Kehena (Government Land), direct azimuth and distance being $348^{\circ} 40'$ 1488.0 feet;
6. Thence along the fence bounding Kehena (Government Land) and the land of Halawa to Mahinakaka Gulch, the direct azimuth and distance being $296^{\circ} 30'$ 1072.0 feet;
7. Thence along said fence, bounding Kehena (Government Land) and the land of Halawa to Hooleipalaoa Gulch, the direct azimuth and distance being $291^{\circ} 15'$ 2022.0 feet;
8. Thence the boundaries follow the land of Kehena 2nd by descriptions in Certificate No. 17 along the heads of the lands of Aama-kao, Makapala, Niulii, Waiapuka, Makanikahio 1 and 2, to West edge of Pololu Valley, thence mauka and around the edge of Pololu Valley to Honokane (as per Boundary Certificate No. 14), at rock + called Kaneaa on West edge of Honokane Gulch;
9. $2^{\circ} 20'$ 5280.0 feet along brow of Honokane Gulch;
10. $29^{\circ} 50'$ 4884.0 feet along brow of Honokane Gulch to a small hill called Kilohana at rock marked K on ledge;
11. $11^{\circ} 52'$ 3130.0 feet along the land of Kahualilii to a projecting spur in Honokane Gulch;
12. $21^{\circ} 17'$ 3130.0 feet along the land of Kahuanui, the boundaries following the winding of the top of Honokane Gulch to a double cross on stone set in the ground on the South peak of the Hinamakanui Crater, this point being the common corner of the lands of Kahuanui, Waika, and Honokane;
13. $294^{\circ} 20'$ 4592.0 feet along the land of Waika to "Waihoalana" (a large cross in triangle) cut in the top of a rock mound, from which the true azimuth and distance is $148^{\circ} 01'$ 131.2 feet to the common corner of the lands of Waika, Kawaihae 1st, and Honokane Nui;
14. $72^{\circ} 10'$ 7640.0 feet along the land of Waika to a point from which the true azimuth and distance to "Puu Pili" Trig. Station is $138^{\circ} 45' 10''$ 3496.5 feet;
15. $318^{\circ} 45' 10''$ 9499.5 feet, following the mauka fence to the gulch on the boundary of Kawaihae 1st and Kawaihae 2nd;
16. $303^{\circ} 47' 17''$ 3308.3 feet, following the mauka fence to angle in same;
17. $334^{\circ} 33' 30''$ 5263.8 feet, following the mauka fence to the gulch on the boundary of Kawaihae 2nd and Puukawaiwai;
18. $43^{\circ} 19'$ 788.0 feet down gulch;
19. $295^{\circ} 43'$ 8892.3 feet following the mauka fence;
20. $00^{\circ} 50' 30''$ 3195.0 feet following the fence;
21. $273^{\circ} 12'$ 8334.2 feet to a point on the ridge;
22. $309^{\circ} 34' 30''$ 7590.2 feet along the mauka fence to the West side of Puukapu Homesteads, 1st Series;
23. $234^{\circ} 25' 00''$ 2600.0 feet following the fence across the mauka tier of Puukapu Homesteads, 1st Series, to Hauani Gulch, on the Eastern boundary of said Homesteads;
24. Thence following down Hauani Gulch to the present forest fence, dividing the pasture land between this and the back line of Puukapu Homesteads, 2nd Series, said point being 7192.4 feet North and 8438.0 feet West from the Government Survey Trig. Station "East Base."

25. 238° 10' 3100.0 feet along the present forest fence;
26. 249° 30' 5980.0 feet along and through forest to corner of fence, the true azimuth and distance from a pile of stones with stone marked with the sign of an anchor being 159° 25' 970.0 feet;
27. 258° 40' 4800.0 feet along and through forest to corner of fence near the head of the land of Lalakea;
28. 200° 16' 50" 10,373.2 feet following the mauka fence line to a stone marked + at corner of fence, said point being the North-west corner of Homesteads (private subdivision);
29. 312° 59' 3107.0 feet to the boundary of Lalakea and Waioekoe at the old Mahiki Road at Waapa;
30. 281° 30' 8050.0 feet across the land of Waioekoe, passing road at 400 feet to corner of fence;
31. 184° 20' 1137.0 feet along fence to corner;
32. 259° 30' 2042.0 feet along fence;
33. 177° 20' 1404.0 feet along fence;
34. 197° 40' 4138.0 feet along fence to corner of present forest reserve on boundary of Mooiki and Keaa;
35. 88° 00' 5490.0 feet to point on the road to Waimea (Mud Lane) which is distant from "Puu Manu" Trig. Stations 4360.0 feet, the true azimuth being 22° 15';
36. 92° 50' 2760.0 feet to a point mauka of No. 1 Reservoir of the Pacific Sugar Mill Co.;
37. 123° 05' 4270.0 feet to a point on the boundary of Waipio above Hiilawe Falls; thence along the top edge of the East Pali to Waipio Valley, the general azimuths and distances being:
38. 129° 40' 860.0 feet;
39. 147° 50' 930.0 feet;
40. 117° 12' 110.0 feet to the top of Puaahuku Ridge, where the boundary of Lalakea descends into Waipio Valley;
41. 31° 20' 5750.0 feet to a point where the boundary of Lalakea again meets the top of pali;
42. 30° 30' 450.00 feet along top of pali;
43. 11° 00' 1050.0 feet along top of pali;
44. 103° 40' 5200.0 feet, more or less, across Waipio Valley to the top of the West pali;
45. Thence following along the North side of Kawainui branch of Waipio Valley, crossing the head of Waimanu Valley, thence in a Westerly direction along the boundary of Hamakua and Kohala (being also the South boundary of the HAMAKUA PALI FOREST RESERVE) to the junction of the lands of Honokane, Kawaihae 1st, and Puukapu;
46. Thence along down between the boundary of the land of Honokane and the HAMAKUA PALI FOREST RESERVE IN A Northerly direction;
47. Thence along down the middle of Honokea Gulch to its intersection with the boundary between Awini Homestead Lots 2 and 3;
48. Thence along the boundary between said Lots 2 and 3, and 1 and 4 of the Awini Homesteads, the true azimuth and distance being 90° 00' 4104 feet to the Honokane-iki Gulch;
49. Thence down the Honokane Gulch to the sea;
50. Thence along the sea to "Kapili Rock" on the boundary of the lands of Honokane and Pololu;
51. Thence still along the sea to a point on the edge of the pali called "Pohaku Kumaka" on the boundary of the lands of Pololu and Makanikanio 1st;
52. Thence following the boundary between Pololu and Makanikahio 1st to the point of beginning.

Excepting and Reserving from the ahupuaa of Pololu, the kuleanas, the privately owned ili of Pa-u, and the Government rice and other bottom lands in Pololu Valley, area 300 acres, more or less.

Total area, 29,627 acres, more or less. (In government ownership, 14,204 acres.)

AND as provided by law, subject to the existing leases, I do hereby SET APART as parts of the Kohala Mountain Forest Reserve those portions of the government lands of Owini (100 acres), Pololu (1000 acres), Lamaloloa (24 acres), Kawaihae 1st (3370 acres), Puukawaiwai-Panoluukia-Kapia (360 acres), Pauahi (150 acres), Momoualoo (130 acres), Lanikepu (435 acres), Puukapu (8385 acres), Kamoku (20 acres), and Keaa (230 acres), altogether an area of 14,204 acres, more or less, that lie within the metes and bounds of the above described Kohala Mountain Forest Reserve.

(Seal)

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu this 13th day of October, A. D. 1913.

E. A. MOTT-SMITH,
Acting Governor of Hawaii.

PROCLAMATION OF FOREST RESERVES IN THE DISTRICTS OF HILO AND PUNA, ISLAND AND COUNTY OF HAWAII, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby, subject to the existing leases, SET APART as forest reserves, to be called respectively the UPPER WAIAKEA FOREST RESERVE and the UPPER OLAA FOREST RESERVE, those certain pieces of government land in the Districts of Hilo and Puna, Island and County of Hawaii, Territory of Hawaii, which may be described roughly as being the block of native forest on the lower slopes of Mauna Loa lying above the agricultural land back of Hilo and to the north and west on the various Olaa homestead subdivisions, and containing, respectively, areas of 51,800 acres and 9280 acres, more or less, more particularly described by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked Government Survey Reg. Map No. 1808, and "Upper Waiakea" and "Upper Olaa Forest Reserves," and descriptions accompanying the same, numbered respectively C.S.F. Nos. 2430 and 2476, which said descriptions, now on file in the said Survey Department, are as follows:

UPPER WAIAKEA FOREST RESERVE.

Portions of the Government lands of Pihoonua and Waiakea,
District of Hilo, Island of Hawaii.
C.S.F. No. 2430.

Beginning at the Government Survey Trig. Station "Kulani" at the intersection of the lands of Olaa, Keaunohu, and Waiakea, as shown on Government Survey Reg. Map No. 1808, and running by true azimuths:

1. 162° 58' 56.790 feet, more or less, along the land of Waiakea to a point at lower Mawae, near a small island in lava flow;

2. Thence along the HILO FOREST RESERVE along edge of lava flow of 1855 to the Northwest corner of the Land of Punahoa 2nd, the direct azimuth and distance being: 256° 27' 33,580.0 feet, more or less;
 3. 341° 00' 7000 feet, more or less, along the land of Punahoa 2nd;
 4. 93° 20' 5230.0 feet, more or less, along the land of Kaumana;
 5. 1° 00' 640.0 feet, more or less, along the land of Kaumana;
 6. 29° 30' 2750 feet, more or less, along the land of Kukuau 2nd;
 7. 350° 00' 1150 feet, more or less, along the land of Kukuau 1st to a point a little South of the lower end of a small branch of the lava flow of 1855 at a place called Kapualei;
 8. 285° 30' 24,500 feet, more or less, along the land of Kukuau 1st;
 9. 309° 21' 26,710.0 feet, more or less, across the land of Waiakea to the North corner of Lot 232 of the Olaa New Tract Lots;
 10. 63° 20' 62,845.7 feet, more or less, along the Olaa New Tract Lots, and the Land of Olaa to the point of beginning.
- Area, Waiakea, 51,200 acres; Piihonua, 600 acres. Total area, 51,800 acres.

UPPER OLAA FOREST RESERVE.

Portion of the Government Land of Olaa, District of Puna,
Island of Hawaii.
C.S.F. No. 2476.

Beginning at the Government Survey Trig. Station "Kulani" (marked by a copper bolt in a concrete post) at the intersection of the lands of Olaa, Keauhou, and Waiakea, as shown on Government Survey Reg. Map No. 1808, and running by true azimuths:

1. 243° 20' 12,694.0 feet along the land of Waiakea;
 2. 318° 32' 30" 26,210.0 feet along the Southwest side of Cross Road No. 8 to a point on the Northwest boundary of Lot IV of the Otto Rose Settlement Association Lots;
 3. 59° 31' 4492.0 feet along Lots IV and V of the Otto Rose Settlement Association Lots;
 4. 149° 31' 3000.0 feet along Lot V of the 27½ Mile Tract;
 5. 59° 31' 5858.0 feet along Lots V and VI of the 27½ Mile Tract;
 6. 329° 31' 6000.0 feet along Lots VI and VII of the 27½ Mile Tract;
 7. 59° 31' 2950.0 feet along Lots VII, VI and V of the Kilauea Settlement Association Lots and across Wright Road;
 8. 329° 31' 1000.0 feet along the Southwest side of Wright Road to the North corner of Lot IV of the Kilauea Settlement Association Lots;
 9. 59° 31' 4356.0 feet along Lots IV, III, II and I of the Kilauea Settlement Association Lots;
 10. 149° 31' 30,575.0 feet along the land of Keauhou to the point of beginning.
- Area, 9280 acres.

(Seal)

IN WITNESS WHEREOF, I have hereunto
set my hand and caused the Great Seal of
the Territory of Hawaii to be affixed.
DONE at the Capitol in Honolulu, this 13th
day of October, A. D. 1913.

E. A. MOTT-SMITH,
Acting Governor of Hawaii.

PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE MOLOAA FOREST RESERVE, DISTRICTS OF HANALEI AND KAWAIHAU, ISLAND AND COUNTY OF KAUAI.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby MODIFY the boundary and slightly change the area of the Moloaa Forest Reserve in the Districts of Hanalei and Kawaihau, Island and County of Kauai, Territory of Hawaii, created and set apart by Proclamation of the Governor of Hawaii, on June 5, 1909, by eliminating therefrom an area of 83 acres and by adding thereto an area of 34 acres, which modification of boundary is more particularly shown by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked Government Survey Reg. Map No. 2375 and "Moloaa Forest Reserve," and a description accompanying the same, numbered C.S.F. No. 2431, which said description now on file in the said Survey Department, and hereby approved as now constituting the official description of the Moloaa Forest Reserve, differs from the original description (C.S.F. No. 1961) that forms a part of the proclamation of the Moloaa Forest Reserve, in the following courses:

1. 277° 55' 4748.2 feet crossing Pilaa, the South portion of Grant 757 to Castro, the Moloaa Stream and the Government portion of Moloaa to a Forest Reserve Monument at small ridge North of the old Swift Mountain House; elevation 739 feet;
2. 244° 59' 3810.3 feet across Government portion of Moloaa to a Forest Reserve Monument in a pile of rocks about 100 feet North of Kalaina's grave; elevation 593 feet;
3. 301° 16' 30" 1034.6 feet across Government portion of Moloaa to a Forest Reserve Monument on ridge at "Puuelemanu" just West of Keapaweo Stream; elevation 643 feet;
4. 282° 15' 4026.0 feet crossing the Keapaweo Stream, the Lindsay Lot and Grant 549 to E. Rouxel to a redwood post;
5. 207° 08' 866.2 feet along Grant 549 to Ed. Rouxel to a + on stone;
6. 304° 48' 469.2 feet along the South side of Grant 535 to a + on stone;
7. 320° 15' 4239.0 feet along Moloaa Hui land to a redwood post;
8. 312° 51' 1228.2 feet across Papaa (Moloaa Hui lands) into land of Aliomanu (Moloaa Hui Lands) to a Forest Reserve Monument at "Nakii"; elevation 320 feet;

AND, as provided by law, I do hereby ELIMINATE from the Moloaa Forest Reserve the area lying between the lines in the old and in the new descriptions numbered Courses 1 and 2 (83 acres), and do likewise hereby SET APART as an integral part of the said reserve the area (34 acres) bounded by Courses 4 to 8 inclusive of the said revised description, C.S.F. No. 2431, lying within the metes and bounds of the MOLOAA FOREST RESERVE.

(Seal)

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed, DONE at the Capitol in Honolulu, this 13th day of October, A. D. 1913.

E. A. MOTT SMITH,
Acting Governor of Hawaii.

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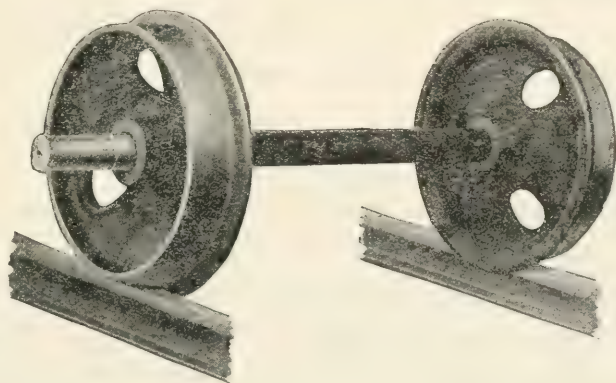
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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications
SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207,
HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

NOVEMBER, 1913.

No. 11.

Next to the control evidenced over the various maladies of different species of livestock, there is nothing more gratifying in the report of the Division of Animal Industry for October than the information relative to the comparative cleanliness of stables in Honolulu. Not long ago there was much to be desired in this respect. In view of published medical opinion that infantile paralysis is communicated by the stable fly, this subject is of more than ordinary importance to human beings.

That only nine animals should have been condemned out of 377 tested in October indicates that the control of bovine tuberculosis on this island has advanced far beyond the fabric of a dream. It is up to the other islands to prosecute the campaign to a like degree of success, when Hawaii will stand out prominently among all countries for intelligent grappling with this vital concern.

Last month the Division of Entomology made the usual fine record of pests intercepted. The monthly figures on this score are among the most interesting information published of the various services of the territorial Board of Agriculture and Forestry.

More than three-quarters of a million acres of forest reserves place Hawaii, in proportion to its area, well up in the list of countries that are conserving and extending their resources of this description of public wealth. In time this insular territory may not have to bewail the absence of mineral deposits as a source of public revenue, for when developed thoroughly upon the lines now being followed the forests, both public and private, will yield a large tribute to territorial and county treasuries, in direct and indirect realizations.

It may take years to show results in large measure, but the gift of prophecy is not required to foresee the time coming when the work of the Division of Hydrography, begun as it were only yesterday, will have fruition in the transforming of many thousands of acres of now arid desert and mountain wilderness into land of teeming productivity of useful animals and plants.

Rivers of waters today seen, at different seasons, rushing wastefully over cliff into ocean will be diverted inland to fatten field and pasture. Not only that, but the habitations of men in town, village and country will be lighted, as well as furnished with power for domestic industries, by the agency as yet latent in the wasting floods.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, Oct. 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I have the honor to present herewith a report on the work of the Division of Animal Industry for the month ending October 31, 1913:

Bovine Tuberculosis Control.

With the exception of a part of the cattle on the railroad ranches, comprising about a week's work, the present test is finished and the tabulated results will be presented to the board shortly, in a separate report.

Glanders.

Two suspicious cases have occurred during the month, but in neither case has the diagnosis been confirmed. It was nevertheless decided to submit all stables in Honolulu to a thorough inspection. This work is more than half finished and has proved satisfactory so far as the sanitation of most of the premises is concerned. Some of the Oriental, and especially Japanese, stables leave much to be desired so far as comfort of the animals go, but are as a rule fairly clean.

The race horse Sonoma, which the owner wished to ship to California, reacted to the mallein test and is at present at the quarantine station. The animal is apparently in perfect health and a report on her condition has been sent to the federal inspector in charge of the port of San Francisco in order to obtain his permission before shipment is made, the regulations requiring the mallein test of horses shipped into California.

Hog Cholera.

This disease seems to have abated to a very great extent, no new outbreaks being reported for the past two weeks, though undoubtedly the infection still lingers in most of the pens where animals have died and where the survivors were vaccinated. No

new hogs should therefore be introduced in these herds as yet unless previously injected with serum.

A shipment of two hogs arrived from San Francisco on the 28th unaccompanied by the requisite certificates of health, wherefore they were sent to the quarantine station for two weeks as stipulated in the regulations of this board.

A large piggery at Wahiawa reported the death of a considerable number of small pigs, and an investigation was made. No indication of hog cholera was found, the condition being ascribed to faulty feeding, that is, exclusive swill diet, and a decided lack of lime salts or bone building material in the daily rations. Bone meal, green feed and medicinal treatment were recommended along the lines described in the article on hog cholera published in last Sunday's Advertiser.

Rabies.

The importation of dogs has fortunately fallen off to some extent, the number in quarantine during the past month ranging from 13 to 19. As stated in a previous communication rabies and hydrophobia are steadily increasing in California, for which reason an article on this subject is being prepared for publication. Another attempt, or suspected attempt, at landing a dog from the transport Dix (the dog disappearing after the visit of the inspecting officer, who was told that all of the dogs on board, four in number, were destined for Manila), makes it desirable that the general public should be familiarized with the true nature of this disease and made to realize what the consequences of its introduction here might mean.

Since the above was written there have arrived no less than thirteen dogs here, the majority of which, however, are transients. Nine come with a clean bill of health from New Zealand, a country officially recognized as free from rabies, and are therefore being kept under observation only, but not in quarantine. The other four were taken to the Quarantine Station.

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Oct. 30, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of October:

Tuberculosis Control.

During the past month the following dairy herds have been subjected to the intradermal tuberculin test:

| | T. | P. | C. |
|--|-----|-----|----|
| Sept. 29-Oct. 2, Waianae Plantation..... | 130 | 122 | 8 |
| Sept. 30-Oct. 3, Laie Plantation..... | 21 | 21 | 0 |
| Sept. 30-Oct. 3, Kahuku Plantation..... | 9 | 9 | 0 |
| Sept. 30-Oct. 3, Waialeale School..... | 43 | 43 | 0 |
| Sept. 30-Oct. 3, Y. Agawa..... | 5 | 5 | 0 |
| Oct. 1-Oct. 4, G. Schuman..... | 5 | 5 | 0 |
| Oct. 6-Oct. 9, S. Kananui..... | 2 | 2 | 0 |
| Oct. 14-Oct. 17, Kahuku Ranch..... | 97 | 96 | 1 |
| Oct. 14-Oct. 17, Kawailoa Ranch..... | 65 | 65 | 0 |

The above tabulated list gives a total of 377 head injected and examined for the month, out of which number 368 were passed and 9 condemned and branded.

Next month, November, testing will commence on the railroad ranch at Mokuleia where between six and seven hundred head await inspection. So far 162 head of the railroad's cattle have been inspected with but one reaction, which is a very good showing and would indicate that very few tuberculous cattle will be found on the ranch.

Inspection of Stables.

A thorough and systematic inspection of stables throughout the city was started during the past month and the results, as far as we have gone, are very gratifying both as to the health of the animals and sanitary condition of the stables. Due to the activities of the humane officers no cripples nor animals otherwise unfit for work were found in harness, and out of 167 head inspected in stables only three were incapacitated for work.

As a rule the stables were in very good condition and while the majority had dirt floors they were kept clean and in a sanitary condition. In only two instances were they found in a filthy condition, and the owners were at once informed that the stalls must be cleaned and drained, and plenty of whitewash used. This work will have a very beneficial effect not only in the apprehension and elimination of hidden cases of glanders, if there are any, but in improved sanitation which always follows inspections of this nature.

Importation of Live Stock.

Oct. 3—S. S. Ventura, Sydney: 7 seals for theatrical purposes.

Oct. 7—S. S. Honolulu, San Francisco: 12 horses, 3 mules, D. Ferreira; 2 crates poultry, A. Lambert; 1 crate poultry, Capt. Green; 12 crates poultry, N. B. Lansing; 1 crate poultry, W. F. X. Company.

Oct. 5—S. S. Hyades, Seattle: 1 crate ducks, Mr. Berger.

Oct. 13—S. S. Sierra, San Francisco: 1 crate poultry, E. F. Bishop; 4 crates poultry, A. Carriero; 4 crates poultry, N. B. Lansing; 3 crates poultry, C. G. Peterson; 8 crates poultry, F.

Harrison; 2 crates poultry, E. O. Hall & Son; 1 black Angora cat, A. Lucas.

Oct. 15—S. S. Shinyo Maru, Orient: 1 crate Jap games, X. Kiyomago; 1 crate Jap games, K. Tateya.

Oct. 21—S. S. Lurline, San Francisco: 5 crates poultry, N. B. Lansing; 2 crates poultry, H. G. Wooten; 4 crates poultry, E. O. Hall & Son; 4 crates poultry, A. Carriero; 1 crate poultry, W. F. X. Co.

Oct. 24—S. S. Siberia, Orient: 1 black chow dog, J. M. Riggs.

Oct. 27—S. S. Ventura, San Francisco: 9 crates poultry, W. F. X. Co.

Oct. 28—S. S. Wilhelmina, San Francisco: 2 crated Berkshire boars, E. O. Hall & Son, quarantined at station for two weeks as they were not accompanied by any certificates of health as required by the regulations governing the importation of swine into the Territory.

Oct. 29—U. S. A. T. Dix, Seattle: 286 head of horses and mules, Quartermaster's Dept.; 5 dogs.

Respectfully submitted,

L. N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, Oct. 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of October as follows:

During the month 43 vessels arrived at the port of Honolulu of which 25 carried vegetable matter and one vessel moulding sand.

| <i>Disposal</i> | <i>Lots</i> | <i>Parcels</i> |
|--------------------------------|-------------|----------------|
| Passed as free from pests..... | 884 | 24,782 |
| Fumigated | 3 | 255 |
| Burned | 49 | 108 |
| Returned | 2 | 26 |
| Total inspected | 938 | 25,171 |

Of these shipments 24,927 packages arrived by freight, 128 packages by mail and 16 packages as baggage of passengers and immigrants.

Rice.

During the month 19,475 bags of rice arrived from Japan, which, after close inspection, were found to be free from pests and were passed for delivery.

Pests Intercepted.

Thirty packages of fruit and 18 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were all seized as usual and destroyed by burning. Four lots of chestnuts from Japan were found badly infested with the large chestnut weevil (*Balaninus* species) and were burned. Twenty-six packages of fruit from the Coast were returned to shipper on account of being infested with codlin moth and peach moth.

A shipment of chrysanthemum plants contained a colony of ants. The shipment was fumigated with carbon bisulphide and all soil carefully removed. The species (*Prenolepis obscura*) has been intercepted several times during the past few years.

Hilo Inspection.

Brother M. Newell of Hilo reports the arrival of four steamers during the month, all of which carried vegetable matter consisting of 237 lots and 4010 parcels. As all shipments were free from pests they were allowed to land.

Beneficial Insects.

Twelve lots of inoculated Japanese beetles were delivered during the month.

Inter-Island Inspection.

During the month of October 58 steamers were attended to and the following shipments were passed:

| | | |
|------------------------|-----|----------|
| Plants | 34 | packages |
| Taro | 585 | " |
| Fruit | 45 | " |
| Vegetables | 58 | " |
| | | <hr/> |
| Total passed | 722 | " |

The following packages were refused shipment:

| | | |
|-------------------------|----|----------|
| Fruit | 8 | packages |
| Plants | 11 | " |
| Vegetables | 2 | " |
| | | <hr/> |
| Total refused | 21 | " |

All of these were refused on account of either being infested with pests or having soil attached to the plants.

Your superintendent returned from his trip to the Coast on November 4. While in California I got in touch with the several

State departments and also came in direct touch with some of the leading fruit dealers and heads of the steamship lines. These people are very anxious to coöperate with the Division of Entomology in every way. They appreciate the firm stand we have taken in regard to infested shipments and are particularly anxious to maintain the large trade they now have with the Islands and will see to it that our demands are complied with.

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, Oct. 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for October, 1913:

New Forest Reserves.

Pursuant to the required call a public hearing was held on October 8, by the Acting Governor and members of the Board of Commissioners of Agriculture and Forestry to consider the creation of four forest reserves on Hawaii and Oahu, of which mention has been made in earlier reports. No opposition was offered to any of these projects. On October 13 the Acting Governor signed proclamations establishing the boundaries and setting apart the government lands contained therein. The new reserves are as follows:

| Name | District | Total area acres | Area Gov't. land acres |
|--|----------|------------------------|------------------------------|
| Kohala Mountain, Kohala and Hamakua, Ha- | | | |
| waii | | 29,627 | 14,204 |
| Upper Waiakea, Hilo, Hawaii | | 51,800 | 51,800 |
| Upper Olaa, Puna, Hawaii | | 9,280 | 9,280 |
| Honolulu Watershed, Honolulu, Oahu | | 6,950 | 5,000 |

At the same hearing there was considered the modification of a section of the boundary of the Moloaa forest reserve on Kauai. This also was approved by the Acting Governor. With these changes there are now 34 forest reserves in Hawaii, having an aggregate total area of 786,869 acres, of which 540,877 acres, 69 per cent, is government land.

Trip to Hawaii.

From October 11 to the end of the month I was away from Honolulu on a field trip that covered the Districts of Puna and Hilo, on the Island of Hawaii. Directed primarily to securing information as to forest fencing requirements, this trip enabled me to secure various other data in regard to the present condition of the forests in those districts. I first visited Puna to see the operations of the Hawaii Hardwood Company, successor to the Hawaiian Lumber Company, that holds a license to cut ohia on government land. Next I spent several days along the upper edge of the forest covering the lower slopes of Mauna Kea in the Hilo district, more particularly along the line of forest fence maintained by the Puu Oo ranch. On my return I came down through the forest on the government land of Manowaialee, at present under lease to the Kukaiau Ranch Company.

I then worked along the coast toward Hilo, visiting and inspecting the lower boundary of the forest above the cane fields in the Hilo district, but more especially observing the conditions on government land and on untaken homestead lots at or near the edge of the forest. Similarly I put in two days back of Hilo on the lands between and including Kaiwiki and Piilhonua.

The remainder of my trip was devoted to a visit to the upper Olaa section, to get in touch with present conditions in the forest and to look into several special problems peculiar to that region. The result of my observations in the Puna and Hilo districts will form the subject of a special report soon to be submitted to the board.

Hilo Sub-Nursery.

While in Hilo I visited the sub-nursery maintained by the Board of Agriculture and Forestry under the direction of Brother Matthias Newell. As at the time of earlier visits, this nursery was found to have on hand a good assortment of seedlings of the kinds of trees most in demand on Hawaii. Notice has been given so often that trees may be obtained from Brother Matthias that it seems almost superfluous to repeat the offer, but in case this report comes under the eye of anyone wanting trees, who does not know it, mention may again be made of this effort of the Board of Agriculture and Forestry to get seedling trees into the hands of those who want them.

The section naturally served from the Hilo nursery covers the Hilo and Puna districts and such parts of Hamakua as are within reach of the Hilo railroad. Application for trees should be made direct to Brother Matthias at Hilo.

Routine Work.

During October the usual routine work of the Division of Forestry has gone steadily on. A detailed account of it is given in the report of the Forest Nurseryman, which is transmitted herewith. Not a little attention this past month has been given to preparing for the free distribution of trees on Arbor Day. By proclamation of the Acting Governor, Friday, November 14, has been designated this year as the day so to be observed. As usual any person desiring to plant trees may, on condition that he will agree to care for them, have 24 seedlings, free, on Arbor Day.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, Oct. 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the work done during the month of October, 1913:

Nursery—Distribution of Plants.

| | In seed boxes | In boxes transplanted | Pot grown | Total |
|------------------|------------------|--------------------------|--------------|------------|
| Sold . . . . . | ..... | ..... | 169 | 169 |
| Gratis | 1000 | 350 | 1925 | 3275 |
| | <hr/> 1000 | <hr/> 350 | <hr/> 2094 | <hr/> 3444 |

Collections.

| | |
|--|----------------|
| Collections on account of plants sold amounted to..... | \$ 6.50 |
| Proceeds of sale of automobile by Water Works Dept. | |
| 520/1775 of \$350..... | 101.40 |
| Total | <hr/> \$107.40 |

Plantation Companies and Other Corporations.

The distribution during the month amounted to 8000 plants in seed boxes and 6000 in transplant boxes.

Makiki Station.

Both at this station and at the nursery much of the time has been taken up in getting trees ready for Arbor Day. We have now ready for distribution a large number of well grown plants.

Honolulu Watershed Planting.

The work on the face of Sugar Loaf is progressing and a large number of holes are now dug and ready for planting which will commence just as soon as the ground gets sufficiently moist. A tool and shelter shed has been erected so that the transplanting can be done during heavy rains. The water which we are able to collect from the roof of the shed will be sufficient to take care of the trees in the small nursery adjoining. One dozen 50-gallon barrels have been set up for the purpose of storing the water.

The preliminary work (consisting of making trails and putting up the buildings, etc.) being completed, we will now be able to devote all of our time to the propagating and care of the tree.

U. S. Experimental Planting, Nuuanu Valley.

The severe drought has made it necessary at times to carry water from quite a distance to keep the trees in the nursery alive. This and other routine work has kept the man busy.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

 DIVISION OF HYDROGRAPHY.

November 6, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of October, 1913, is submitted:

Drought.

Official reports from Kauai, Oahu and Maui, and rumors from Hawaii indicate that the extreme drought still continues on Oahu and Maui, but has been at least temporarily broken by heavy rains on Kauai and Hawaii.

Kauai Irrigation Projects.

The undersigned completed an inspection and reconnaissance trip on Kauai during the month, and visited all mountain stations, including the rainfall station on Waialeale (5080 feet), the "top" of Kauai.

While it is not within the province of this division to project irrigation schemes, the intelligent investigation of surface water resources demands looking into the future in regard to water utilization.

It is well known that leeward Kauai has suffered from lack of water at dry periods for many years, while on windward Kauai the Wainiha, Lumahai, Waioli, Hanalei and Kalihiwai streams have been wasting hundreds of millions of gallons per day into the sea during these same periods.

The low water discharge from the Kilauea, Anahola, Kealia, Kapaa and Wailua valleys is all needed in the immediate vicinity.

Heretofore the estimated cost of diverting these big windward streams has been considered too high to justify the project, but, regardless of the economic prospect for the next few years, this big project is certain to develop in the next decade. Temporary measures in the nature of the Kauai Electric Power Company for pumping and the new \$150,000 ditch from the South Wailua to Koloa, which is to be started by the Lihue Plantation Company in the near future, will only partially relieve this shortage.

It is estimated that these streams should be diverted at an elevation of about 700 feet above sea level to deliver water at the 650 feet contour in the Wahiawa and Koloa valleys. At these elevations it is impossible to obtain gage readers, and, except on the Wainiha stream, which may be ascended on the power line ditch trail, these points are at present inaccessible by trail of any kind.

Suitable sites for automatic clock register stations have been located on the Wainiha, Lumahai, Hanalei and Kalihiwai streams, at about the 700 feet level, and trails will be cut to these points and stations will be established during November and December. A station will be established on the Waioli, the smallest of the five, as soon as more funds are available. From dry weather measurements made at low levels it is estimated that 150 million gallons per day can be diverted from these five streams, and sufficient water be left in the streams to supply present rice and taro lands.

Kauai.

The drought was broken by a general rain which covered the entire island on October 24, 25 and 26, and which, contrary to usual practice, was heaviest at low levels and on the leeward side of the island. Mr. Hardy spent 15 days, October 10-24, with the superintendent on reconnaissance and inspection. All mauka stations, including Waialeale (5080 feet) were visited, and future clock register station sites located. Station sites were also selected on the Olokele, Kealia, Wainiha, Waioli, Lumahai, North Wailua and Kalihiwai streams. The first seven days were spent on computation and compiling work in connection with the third quarter gage height records. The last seven days were spent

on stream measurements and accounts. Mr. Horner was detained in Waimea twelve days on account of his wife's serious illness. The balance of the month was spent on gathering rainfall records and stream measurements.

Maui.

Both Mr. Bailey and Mr. Christiansen were employed during almost the entire month on the construction of five new clock register stations on the streams of East Maui. Besides the four stations on the Kailua, Nailiilihaele, Waikamoi and Haipuaena streams, which were completed in September, work was started on the Hanawi, East and West Kopiliula, East Wailuaiki and Wailuanui streams. Twelve stream measurements were made.

The extreme drought on Maui still continues, and plantations are suffering for want of water.

Oahu.

A concrete weir with a low water 2.0 feet crest opening, and a flood water 12.0 feet crest opening, was begun on the upper Nuuanu stream on October 10, and work was temporarily suspended on October 18, to allow for necessary change of design. This weir is to measure waste water of the Nuuanu valley to determine whether the amount is sufficient to augment the present city supply. The discharge so far indicates that a mean of about one-half million gallons per day may be added to the city's supply at this point.

A reconnaissance and miscellaneous measurements were made of the springs and small streams supplying the Makawao ditch which serves the Waimanalo plantation. These measurements, as well as measurements on the Kaukonahua, show that the drought still continues on Oahu.

Seepage and miscellaneous measurements were made on a number of the ditches of the Oahu Sugar Company, and a measurement made of the outflow from the north portal of the Waiahole tunnel shows that this discharge has decreased to 14.6 million gallons per day, and is steadily decreasing.

Kona, Hawaii.

The field work of this, excepting the maintenance of rain gages and one stream gaging station on the Kiilac stream, is nearing completion. All reservoir sites have been completed, and the population and present water supply census is nearly so. The undersigned, accompanied by Mr. T. F. Sedgwick, underground water expert, expects to spend November 10 to 13, in looking

over dry weather conditions in Kona. It is expected that all field work, excepting rain and stream gaging maintenance, will be completed by November 30, 1913.

Very respectfully,

G. K. LARRISON,
Superintendent of Hydrography.

THE KALO IN HAWAII (V).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

LIST OF VARIETIES (Concluded).

156. *MANINI*. This is the name of a brightly striped fish, and the kalo is so called because in the striping of its petioles it resembles this fish. Another explanation is that *nini* refers to anger, especially the "anger of the gods," and that either the fish or the kalo *Manini* could be used to appease the *nini* or anger of the gods when offended. A place formerly famous for its *Manini* kalo was Wahiawa, on Kauai. There are several sub-varieties, all grown in *lo'i*.

157. *MANINI HA KIKOKIKO*. The petioles of this kalo are striped with dark purple. The corm is white within, and resembles *Maka opio*. It matures in one year, and is good steamed or made into *poi*.

158. *MANINI KAKAU*. *Kakau* means striped or spotted; it is identical with the word *tatu* or *tatoo*. This kalo is planted in *lo'i* or wet places near the edge of the woods. It is well known on Oahu and Maui (Kalihi, Waihee). The corm is very large, and is white within. The leaf blade is large and mottled, the petioles are conspicuously striped with dark purple. This kalo was considered suitable for medicine, and for offering to the gods.

159. *MANINI LAU KIKOKIKO*. Like *Manini hakikokiko* except that the leaf-blade is conspicuously mottled with dark purple.

160. *MANINI ULA*.

161. *MANININI*. No data, save that it is stated that this kalo is not one of the *Manini* group.

162. *MANUIA*. This kalo is said to be similar to *Haokea*, save that the leaves and huli are striped.

163. *MAUA MELEMELE*. Corms under this name were sent from Hilo region to the U. S. Department of Agriculture by L. C. Lyman, 1908.

164. *MAUA ULU*. According to Mr. L. C. Lyman, a synonym for *Maua melemele*.

165. *MIMI IOLE*. This kalo is raised in unirrigated fields, particularly in the Hilo region. The corm is long and cylindrical in form; it is white within, of a sticky or gummy consistency, and of

sweet taste. The *poi* is very good. The foliage has no distinctive markings.

On Kauai this peculiar name, which means "rat urine," is not applied to a special variety of kalo, but is applied to various kalos when they are grown under particular conditions, namely: The wild rats come down to the kalo fields, or to patches of wild kalo, and carry away some of the smaller corms to their homes in the trees. Here they devour the corms at their leisure, and frequently leave fragments that fall into the crotches or knot holes of the tree, and grow there. So this kalo grows epiphytically in the koa, lehua and other trees, and according to native belief is fertilized by the rats. The varieties *Ahe ulaula* and *Ahe kookoo* have been found growing in this unique manner.

166. MOA. See *Hua moa*.

167. MOHIHI.

168. MOI.

169. MOKIHANA. So called from the fragrance of its corm, when cooked. It has the same delicious odor as the *Kai*.

170. MOKOHI. Also called *Makihi*. Raised in *lo'i*, and in unflooded fields. The corm is red within; the *poi* is pink. The leaf-blade is cup-shaped, like *Apuwai*; it has a reddish tinge. The petiole is dark green, with a conspicuous reddish band at the base like *Piialii*. This kalo resembles the *Lchua*, except that *Lchua* corms cannot be eaten as soon as cooked, because of their acidity, but must first be made into *poi*. In the same way the leaves of *Mokohi*, lacking acidity, make excellent *lua'u*, whereas those of *Lchua* do not. *Mokohi* corms mature in one year.

171. NAIO. Grown in upland fields, Kona, Hawaii, and also on Kauai. Corm is light gray within; the petioles are almost black. This kalo differs from *Piialii* in the color of the petioles, which in the former are very red, and in the *Naio* are blackish. Matures in one year.

172. NAIOWA. A Kauai kalo, now extinct, but formerly cultivated in *loi*. The leaf, petiole, corm and *poi* were all light in color. When cooked the corms possessed the delicious odor of the *Kai*. By some natives this variety is said to be synonymous with *Palaii*.

173. NAIOWA ULAULA. A sub-variety of the *Naiowa*, formerly raised on Kauai. The petioles, corms and *poi* of this form were suffused with red or pinkish.

174. NA KALO AOLA O KALALAU. A famous Kauai kalo, so called because the native man Aola on one occasion, years ago, took this kalo from the *loi* of Kalalau Valley and planted it as a dry-land kalo on the upper slopes of Kalalau.

175. NA KALO IRUE.

176. NANA IPUHENE NA KALO.

177. NEENE. Varietal name in use on Oahu.

178. NIO. Varietal name in use on Oahu.

179. *NOHU*. A kalo raised on Oahu and Kauai in *lo'i*, and in Kau, Hawaii, in dry-land fields. The natives consider this a choice variety. All parts of the plant, including the poi, are darkish (*eleele*). There is a form of *Nohu* that has light *poi*.

180. *OHE*. Grown in the Hilo region, on Hawaii; not grown on Oahu. Foliage similar to that of *Ha'okca*. Two sub-varieties are recognized by the natives.

181. *OHEKEA*. Corm white within.

182. *OHE ULAULA*. Interior of the corm pinkish.

183. *OHIA*. A kalo known in South Kona, Hawaii.

184. *OHUEHUE*.

185. *O KA HEE KO KAI*. Cultivated in damp places near the woods, not in *lo'i*. The corms are of average size, reddish within. The foliage at maturity becomes suffused with purple; until this stage is reached it is clear green. This kalo was used in place of the squid (*hee*), when the latter could not be obtained, for the propitiation of the gods in the case of broken vows. The *poi* is not good.

186. *OLAA LOA*.

187. *OLENA*.

188. *OOPUKAI*. Probably a synonym for *Opukai*.

189. *OPAE ULA*.

190. *OPUKAI*. In Kona, Hawaii, this kalo is raised in unirrigated fields; on Oahu and Kauai it is grown in *lo'i*. The corm is white within. The petiole is striped with dark purple. *Lua'u* of this kalo is considered excellent.

191. *OPULE*.

192. *OWALE*.

193. *OWAU*. A kalo raised on Kauai, particularly at Huleia. It is reported to be similar to the *Kikii* in every respect save the leaf, which is orbicular and smaller than that of the *Kikii*.

194. *OWENE*. This is a wild kalo, growing in open woodlands, and similar regions. It is the smallest of all the kalo and was used only when other food supply failed. It grows easily, requiring but little cultivation, and so is planted in places where thorough cultivation is difficult. The leaf is striped with light and dark. The petiole is not striped. There are several sub-varieties.

195. *OWENE ELEELE*. A dark kalo, the petioles, corm and *poi* being grayish or smoky.

196. *OWENE KEOKEO*. Corm white within.

197. *OWENE LENAENA*. The corms and *poi* are yellow.

198. *OWENE MANA*.

199. *OWENE MELEMELE*. Corm small, the size of a turkey's egg; the interior yellow, like the yolk of an egg. Foliage dark green. The *poi* is the same color as breadfruit *poi*.

200. *OWENE ULAULA*. Similar to *Owene melemele* except that the petioles are dark purple, and the corms and *poi* are reddish.



STRUCTURE OF THE KALO PLANT.

Showing the juncture of petioles with corm. It is from this region that the *huli makua* are cut. Observe the elongated, whitish, horizontal markings. These are petiole scars. Note the axillary buds on many of these scars. From these axillary buds develop the *huli oha*; that is, if the parent corm is permitted to remain in the ground for a sufficient time. In commercial practice the corms are usually pulled before these axillary buds have developed. Note the numerous, short, vertical scars, due to the fissuring of the bark by the peripheral expansion of the corm. Note the fibrous nature of the outer bark. In some varieties these fibers are very conspicuous and form a matting over the bark. Note the sheathing base of the petiole, encircling the one within. This kalo is *Pi'iali'i ulaula*.

201. PAAKAI. A kalo occurring on Kauai, and in South Kona, Hawaii.

202. PAAKAI MIKOMIKO.

203. PAKEA. A variety resembling *Haokea*, except as to leaf. The leaf-blade of *Pakea* is much smaller than that of *Haokea*, and is concave, catching water (q. v. *Apuwai*).

204. PALA. Also called *Palakea*. Occurs on Kauai.

205. PALAHA. A variety known on Kauai.

206. PALAH. A kalo grown entirely in upland or unirrigated fields. It is best grown on Maui and Hawaii, but occurs also on Kauai. There are several sub-varieties.

207. PALAH ELEELE.

208. PALAH KEA OR KEOKEO.

209. PALAH PONI.

210. PALAH ULAULA.

211. PALA KEA.

212. PALILI ULAULA. Grown about Hilo, Hawaii.

213. PANA.

214. PAPA KOOLE KA WAA.

215. PAPA KOLE KO'E. This kalo is grown at Waiohinu, Hawaii, in unirrigated patches. It closely resembles the *Naioca* (q. v.). The corm is light colored within when raw, but upon cooking becomes reddish.

216. PAPA PUEO. Grown about Hilo, Hawaii.

217. PAUA. A variety grown on Kauai.

218. PA'U O HILAKA.

219. PEU'. A wet-land variety grown on Kauai. The petioles are very dark; the leaves are larger than those of *Lauloa*; otherwise it closely resembles the *Lauloa*.

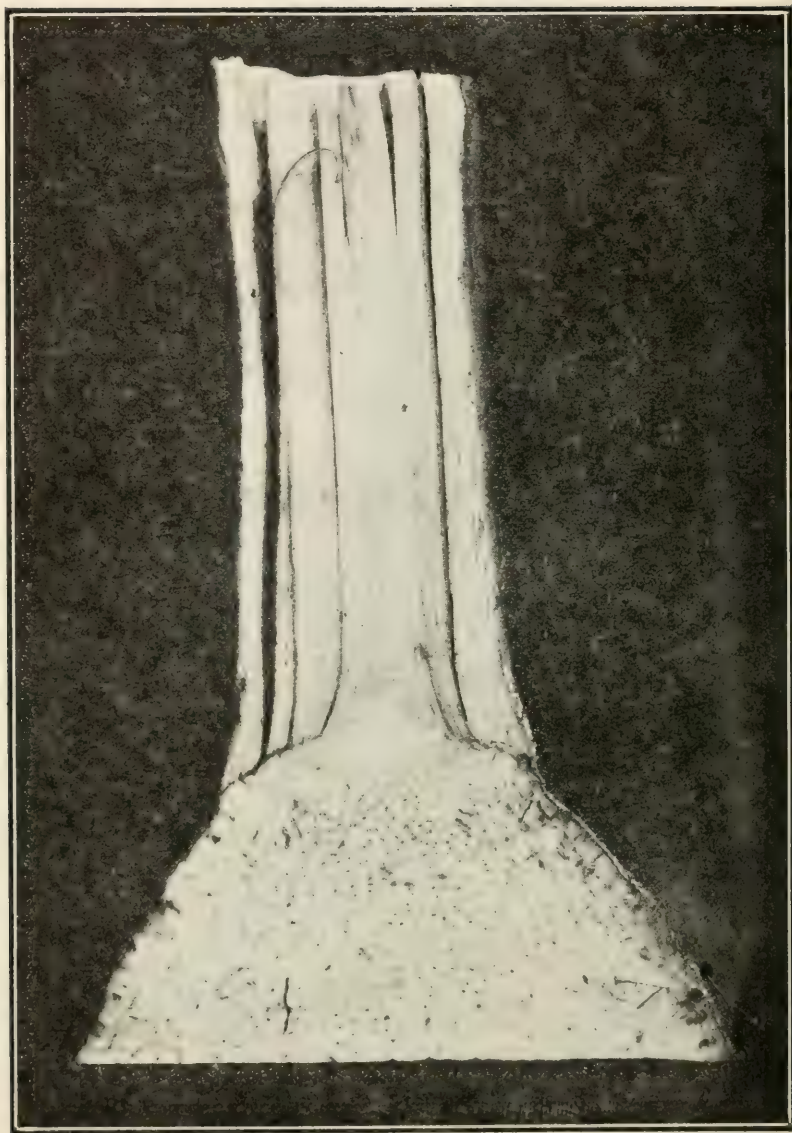
220. PELU HAELE. Varietal name known on Oahu.

221. PIA. Grown in *lo'i* and in unirrigated patches. Corm dark gray within; foliage dark green. A kalo formerly used in religious ceremonies by the *kahunas*.

222. PIPIA. A fragmentary native tradition relates that *Kaululau*, a legendary character, had a son who once wrongfully pulled this kalo, and his eyes became bleared (*piapia*), as a punishment from the gods. This kalo is common on all the islands, and is raised in both wet and dry land. The interior of the corm is light gray. The leaf-blade is dark green, with a purple *piko*. The petiole is green, speckled and striped with purplish. The *poi* is good.

223. PIHALALE. No data.

224. PIHAL. A large and well-known group of kalos, raised extensively both by the Hawaiians and Chinese planters. Formerly a favorite kalo for making *poi* for the chiefs. The natives allow 12-14 months for maturity; the Chinese but 8-10, pulling it too soon to give the best *poi*. Some natives distinguish between



STRUCTURE OF THE KALO PLANT.

Longitudinal median section, showing juncture of petioles with corm. In the corm note: the white, starch-containing tissue that forms the bulk of the corm; the numerous latex-tubes, which form a conspicuous laticiferous tissue, ramifying all parts of the corm; the thin, corky bark, the outermost layers of which become stringy or fibrous. Note the pithy interior of the petioles, and the central bud, of which an embryonic leaf is visible. This kalo is *Pi'iali'i ulaula*.

the *Piialii* and the *Naio* by means of the petioles and corms, those of the *Naio* being very red, while those of *Piialii* are less so.

225. *PIIALII ELEELE*. The petioles, corms and *poi* are grayish or slaty.

226. *PIIALII KEOKEO*. Corms with gray interior.

227. *PIIALII MELEMELE*. Corms with yellow interior.

228. *PIIALII ULAULA*. Corms with pink interior; *poi* pink; leaves suffused with red.

229. *PIKO*. A well-known and extensively planted taro. There are numerous sub-varieties.

230. *PIKO HAO*.

231. *PIKO KEA*. Sometimes wild in the mountains. Raised in *lo'i* and in dry-land fields. Formerly the chief wet-land *kalo* of Kohala, Hawaii, although not raised by the Chinese planters. The natives of Kohala used to plant the *huli* in unirrigated fields for several months (4-6), until they attained good size. Then the *huli* were cut and set out in the *lo'i* to form corms. The original corms in the dry-land fields were left undisturbed with the suckers, to form more *huli*. The corms are light gray, of firm texture, requiring considerable labor to pound and mix with water. The corms require 15 months for complete maturity, although they are frequently pulled at 12 months, or sooner. The *poi* is light bluish in color, and is very good. According to some natives, *Pikokea* is synonymous with *Hapu'u kokeo*.

232. *PIKO NUI*. Grows wild in swampy places; cultivated in both wet and dry land. When grown in wet land, or in swampy places, it attains a height of four feet. The corm is light gray; the *piko* of the leaf-blade is large, and light green; the petiole is dark green, striped with purple.

233. *PIKO A WAKEA*.

234. *PIKO UANA*. So called because of its very extensive root system, which anchors the corm firmly in the mud, and renders the *kalo* difficult to pull (*uana*). Grown in wet and dry land. Corm light gray within.

235. *POHINA*. Varietal name used on Oahu.

236. *PONI*. Cultivated only in *lo'i*. The leaf-blade is very dark green; the outer skin of the petiole is dark (purple). The pigment was extracted by the natives in early times, and used for the dyeing of *kapa*, straw hats, etc. There are several sub-varieties.

237. *PONI ELEELE*. Interior of corm very dark gray.

238. *PONI KEA*. Interior of corm light gray or whitish.

239. *PONI ULAULA*. Interior of corm pink or reddish.

240. *PONI ULIUULI*. A Kauai variety, grown only in *lo'i*. The petioles are dark green.

241. *POPOLO*. Varietal name well known on Oahu.

242. *PUEO*. Cultivated, sometimes wild. Now rare, formerly abundant. The corm is white within, and resembles *Ha'okea*.

The leaf-blade has a wrinkled surface and margin. Because it lacks acidity, the corm was deemed especially suitable for medicine. Matures in 10-12 months. The *poi* and *lua'u* are good. Two sub-varieties are recognized.

243. PUEO HA LENA LENA. Petioles distinctly yellowish.

244. PUEO KEOKEO. Petioles clear green.

245. PUHI.

246. PUO KO NANE.

247. PUWALU. Raised in *lo'i* and in dry-land fields. Corm very dark within; foliage very dark green. Formerly a famous *kahuna kalo*.

248. UAHU A PELE. All parts of this *kalo*, and the *poi* made from its corms, have a peculiar smoky or grayish appearance, like "the smoke of Pele," whence the name. On Hawaii it is called *Ualchu*. It grows wild in damp places; it is cultivated in *lo'i* and in unirrigated fields, and does well in either. The corm is dark gray within; is of average size, and matures in one year. The leaf is too tough for *lua'u*; the corm is not considered suitable for medicine, nor for offering to the gods. This *kalo* was formerly raised in Ewa, Oahu, but was abandoned when rice culture became prominent in the region. It is grown at Kalalau, on Kauai.

249. UAHU A PELE ULAULA. As above, save that the corm and *poi* are pink instead of dark gray. The leaf-blade and petiole are suffused with reddish.

250. UAHU OKI. No data.

251. UALEHU. Synonym for *Uahi a Pele*.

252. ULAMAU. A variety well known on Kauai. The petioles, corm and *poi* are pink. In ancient times the petioles of this *kalo* were boiled, in order to extract the pink color, and this dye was used to give a pink tinge to the *poi* made from various *kalos* that were not pink. The pink tinge was associated with excellence and superior flavor, and so this artificial coloring was practiced.

253. ULA NUI. A variety occurring both wild and cultivated on Kauai. The corm and *poi* are reddish. Also called *Ula mani*.

254. ULALA. A reddish *kalo*, growing wild near Lihue, Kauai. The corm and *poi* are red.

255. ULEI.

256. ULI.

257. UMIUMI. A *kalo* known at Lahaina, Maui.

258. UWAUWAHI.

259. WA'E.

260. WAIANAE.

261. WAIANUENUE. (Water of the rainbow.) A reddish *kalo* occurring on Kauai. All parts are suffused with pink.

262. WELEHU. A *kalo* known at Lahaina, Maui.

263. *WELOWEOLA*. A *kalo* raised on Kauai in *lo'i*; near Hilo, as a dry-land crop. The petiole is reddish, with two darker stripes; the leaf-blade is unmarked; the corm is white within. The name is fanciful and refers to the red rays of the setting sun.

264. *WEHEWA* or *WEHIWA*. Synonyms for *Wewehiwa*.

265. *WEWEHIWA*. A variety raised in the Hilo region, Hawaii.

266. *WIA*.

In describing the varieties of *kalo*, the native Hawaiian uses a color terminology that needs translation into English equivalents, and modification to give it the proper botanic significance with reference to *kalo*. The following terms are commonly used:

1. *Ele-ele*. Intensive of *ele*; dark. To be dark colored, blackish; may be used in connection with any dark color, as very dark green or very dark red.

2. *Ha-kea*. Light colored, not dark, as a light green, or a light yellow; refers to shade or degree rather than to actual pigment.

3. *Ha-lena-lena*. Yellow; yellowish.

4. *Ha-uli-uli*. The intensive of *hauili*; dark, shaded, blackish.

5. *Kaha-kaha*. Marked, striped, streaked.

6. *Kco-kco*. Light colored; light; clear; not dark nor shaded.

7. *Kiko-kiko*. Spotted; speckled; small mottlings.

8. *Mele-mele*. Yellow, amber like; the color of honey; a translucent yellow.

9. *Olena-lena*. Yellow; bright yellow.

10. *Omao-mao*. Green; greenish.

11. *Onio-nio*. Striped; spotted; mottled; with some design or figure, like calico cloth.

12. *Oo-hina-hina*. White; whitish; gray; silvery gray.

13. *Ula-ula*. Reddish; pink or purplish; scarlet.

14. *Uli-uli*. Blue; bluish; bluish-gray; darkish.

In India, China, Japan, and the other countries in which *kalo* is raised there are many variations, many of which deserve varietal rank. The *kalos* of the Hawaiian Islands may be divided into four groups:

a. *Kalos* usually cultivated only in upland, dry-land, or unirrigated regions. Examples: *Elepaio*; *Hoene*; *Ieie*; *Naio*.

b. *Kalos* usually cultivated only in lowlands, wet-lands or irrigated patches (*lo'i*). Examples: *Koac*; *Lau loa onionio*; *Lehua ku i ka wao*; *Pual'i'i*; *Poni*.

c. *Kalos* cultivated in both irrigated and unirrigated lands. Examples: *Apu wai*; *Elecle*; *Hachae*; *Ha'okea*; *Oi*; *Ipu-o-lono*; *Owene*.

d. Wild *kalos*, growing in damp places in or near the forests. Examples: *Ahe*; *Aweoweo*; *Hoolenawao*.

This grouping stands rather for cultural differences, however, than for fundamental distinctions between varieties. It frequently happens that the same variety may be raised in one region as a wet-land crop, and in an adjacent region as a dry-land crop. It is probable that kalo was first grown entirely without irrigation, in lands naturally moist. The evolution of extensive irrigation systems was a later and lengthy agricultural development.

Descriptive data relative to the varieties of kalo have been collected by the authors, through extensive conferences with native Hawaiian kalo planters. This data is necessarily fragmentary, but it is believed to possess intrinsic value.

(To be continued.)

GOVERNMENT REPORTS LOWEST FIRE LOSS.

With the middle of September the fire season on the national forests came practically to an end with less damage than ever recorded. There is always some danger from carelessness of camp or of settlers burning brush and clearing land, but the real danger season extends only from the middle of June until the middle of September.

Forest officers throughout the west are congratulating themselves on a season so markedly free from heavy losses. They feel that the immunity from loss has been due to two principal causes: partly due to a favorable season, but largely to a much better organization for fire protection than has been attained heretofore. The effectiveness of the organization is shown particularly by the fact that while there were in all approximately 2260 fires, as against 2470 last year, yet the area burned so far this year is only about 60,000 acres, as against 230,000 acres in 1912, and 781,000 in 1911. California, Arizona and New Mexico have suffered most during the past season.

The various causes of fires have not changed greatly in their relative proportions. Railroads and lightning head the list, with campers next. There has been, however, a marked decrease in the number of fires caused by burning brush, which, according to the forest officers, indicates a closer coöperation with the settlers in and near the forests and with timberland owners in fire protection and control. It is still true, nevertheless, that a large proportion of all fires started are due to human agencies and may generally be charged against carelessness. Fires caused by lightning are, of course, not preventable, but the system of lookouts by which they may be detected immediately after being set is greatly lessening the loss from this source.

BOARD MEETING.

A meeting of the Board of Agriculture and Forestry was held at the board room of the Waterhouse company Thursday afternoon, November 13, being constituted by President W. M. Giffard and Commissioners H. M. von Holt, John M. Dowsett and A. H. Rice.

Reading of minutes included those of a special meeting at which the president was authorized to approve a license of right of way through Nuuanu valley watershed for the lines of the Hawaiian Electric Company.

Reports of divisions were received and filed without discussion.

A report from the forestry committee on various proposed forest reserves, approving them with certain recommendations, was read by the president.

Removal of sheep from Kahoolawe was a subject included in the report, the decision being that Eben P. Low should be allowed until December 31 next to remove the sheep. This recommendation was adopted by the board.

Further time was given to the committee on the modification of Kealia forest reserve on Kauai.

Approval of the Kuliouou forest reserve on Oahu was voted.

FOREST RIGHTS.

Correspondence between the president and the attorney general on the question of the right of the military to take firewood from forest reserves as against the rights of homesteaders, was read. Attorney General Thayer rendered an opinion in which he held that homesteaders do not have a prescriptive right to take firewood or other material in government forests, and that the soldiers have no more right than civilians to such privileges, but that the whole matter is under control of the Board of Agriculture and Forestry, which has power to grant licenses for the privileges in question in its discretion.

It was the sense of the meeting, on discussion of the question, that the taking of dead wood from the public forests was not necessarily detrimental, and that the granting of privileges should be left with the executive officer.

As, according to Mr. von Holt, firewood on the other side of the island was worth \$12 to \$14 a cord, it was agreed that something should be charged for it, the fixing of price to be in the power of the same officials.

Mr. Hardy, assistant hydrographer of Kauai, was granted leave of absence.

CALIFORNIA AGRICULTURAL EDUCATION.

Following are extracts from the report of the College of Agriculture and the Agricultural Experiment Station of the University of California, for the year ended June 30, 1913, showing what is being done with regard to agriculture in the schools of California:

BOYS AND GIRLS' CLUB WORK.

During the present year boys and girls' clubs have been organized in twenty-six counties. It has not been possible to learn the exact number of clubs or of boys and girls reached through the clubs. The boys and girls' club work may be said to have had its inception at a meeting of the state association of city and county superintendents, at Santa Catalina Island, in August, 1912, though Mr. C. A. Stebbins, connected with the agricultural education division from 1910 to July, 1912, had done some work in the promotion of gardening in elementary schools through an organization known as the "California Junior Gardeners."

A conference was held at Santa Catalina regarding the possibilities in the way of boys and girls' club work for California elementary and grammar schools.

As a result, the advantages of such work were agreed upon, and the advisability of utilizing agricultural and domestic science clubs as a factor in elementary education and as a socializing and educative influence in school communities was made clear. The superintendents were encouraged to start the organization of the clubs in the schools in their respective counties and were informed that the division of agricultural education would be glad to do everything possible to assist them in promoting the work and usefulness of the clubs.

By coöperation between the state and county superintendent of schools, state and county fair officials, and this department there is no doubt that an excellent system of club work can be devised and put in operation. That the results will be worth while seems sure. Wherever boys and girls' club work has been wisely organized throughout a state it has not only proved of value to individual boys and girls and as an aid in agricultural instruction, but it has been an effective and wholesome method of inciting a keener interest in the affairs of scientific agriculture among adults. It has, to a greater or less degree, an inevitable influence upon the work of adult farmers. The father can not help catching some of the enthusiasm of the boy when he sees the value of better farming methods demonstrated to him.

Ease in administration of club work can be secured by making the county the unit for contest work. This will also make possible a variety in the nature of the contests, so that the children can engage in those activities of greatest local importance. The

club work of other states affords many examples of "sufficient incentive" in the way of awards, which we may profit by in developing the work. Trips to the state agricultural college, to the university farm school, to the state fair, or to a boys' or girls' camp, have all proved popular as the highest award for a county. Lesser awards, significant in character, can readily be arranged for winners of local contests. Exhibition of prize products of each club at the county fair, exhibits at the state fair, etc., are legitimate means of popularizing and adding interest to the work.

SEED DISTRIBUTION.

As a part of the extension work for schools the seed exchange of previous years was continued through 1912-1913. Miss Jones was in charge of this work and reports a total of 218 seed packets sent out during the year, to twenty different schools. In connection with this work suggestions were made and advice given, where requested, as to the choice of plants and as to planting plans for school grounds, home grounds, etc. Lists of vines suitable for use in different parts of California, a list of plants that grow well in the shade, and a list of drought resistant plants were also prepared in response to inquiries.

AGRICULTURE IN CALIFORNIA SCHOOLS.

During the past year agriculture was taught in fifty-one high schools of the state, the courses varying from one to four years in length. In response to letters sent to the fifty-eight county superintendents in the state regarding the present status of agricultural instruction in the elementary and grammar schools, thirty-six replies were received. Six superintendents reported that agriculture was not being taught in their schools, the reasons being that severity of climate or non-agricultural districts naturally eliminated the subject from the schools. One superintendent did not favor the introduction of agriculture in the grammar grades until it could be properly taught, which he did not consider possible under his present conditions and with his present teachers. He thought club and contest work would meet his requirements best for the present. Eleven counties reported that their schools were required to offer agriculture as a subject in the seventh and eighth grades. This work in most instances consisted merely in one or two terms of reading of some prescribed text. In a few counties the course is outlined in the county manual which the teachers are expected to follow more or less closely.

School garden work is reported in twenty-eight counties and it is being given in four or five other counties that did not report.

CHINESE REPUBLIC STUDIES OUR FOREST METHODS.

David Z. T. Yui, formerly secretary to the vice president of the Chinese Republic, is now traveling in this country to learn modern methods for adoption in China. He is at present in charge of the lecture board of the Chinese Y. M. C. A., which is in close touch with the new government and is aiding in putting into effect an educational campaign for the citizenship of the republic.

While in Washington recently Mr. Yui spent some time investigating the work of the forest service, in order that he might find out whether its organization and methods would be of value to the newly created department of agriculture and forestry in China. In speaking of this part of his work, Mr. Yui said:

"In the matter of forest conservation the United States profited much by looking upon the disasters which were the result of the Chinese neglect of forestry. This was a great warning to you. Now we wish to profit by the improved methods of forestry which the United States has discovered and applied."

AYRESHIRE RECORD.

Following is a summary of the official Ayreshire record No. 24, issued by the Ayreshire Breeders' Association, Brandon, Vt., of date October 10, 1913:

| | Lbs. Milk. | Lbs. Fat. | Lbs. Butter. | %Fat. |
|--|---------------|--------------|-----------------|-------|
| Average of mature form is..... | 11,161 | 440.16 | 518 | 3.98 |
| Average of four-year-old form is..... | 12,630 | 523.77 | 617 | 4.09 |
| Average of three-year-old form is..... | 9,471 | 384.45 | 452 | 4.07 |
| Average of two-year-old form is..... | 9,071 | 351.15 | 413 | 3.86 |
| Average of the whole, cows and heifers, is | 9,940 | 394.37 | 464 | 3.95 |

Washington stands first in lumber production, with Louisiana second.

It is estimated that 90,000,000 broom handles are used annually in the United States—one for each man, woman, and child.

Much of the cork used throughout the world comes from Portugal, which harvests about 50,000 tons a year.

Germany is said to have an oversupply of foresters: so that well-educated men have hard work to secure even inferior positions.

One of the largest forest nurseries in the United States is conducted by the forest service near Haugen, Montana. It is known as the Savenac nursery and has a capacity of 4,000,000 young trees a year.

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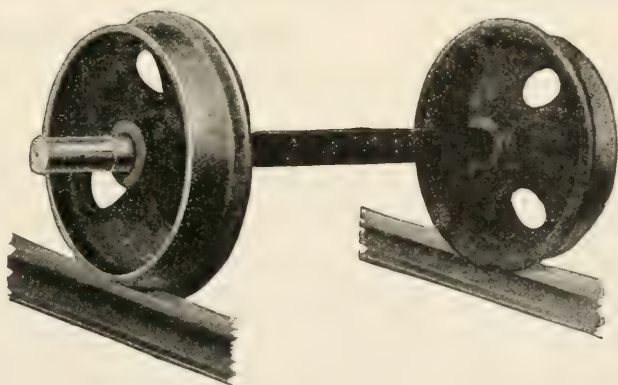
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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division, and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief, we like and sometimes it is indispensable for us to see the insects suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed by parcels post. When specimens are not accompanied by letter always write your name and address in the upper left-hand corner of the package. Address all communications **SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.**

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

DECEMBER, 1913.

No. 12

A news article in this number shows what the College of Hawaii is doing to improve the production of corn in this Territory.

Interest has been renewed in the subject of the commercial growing of coconuts in these Islands by the arrival from San Francisco of a manufacturer, who is in quest of the raw material for some unnamed commodity to be made from the husks of the nuts. This visitor, Mr. Alexander Z. Rothschild, is reported as ready to enter into negotiations with anyone here who will undertake to grow coconuts for a factory that he will start in Honolulu if a supply of the raw material be assured. Although, notwithstanding that there are responsible men here who are interested in coconut growing, it does not appear that anyone has yet been able to get in practical touch with the promoter of the enterprise in question, still it is deemed well to reprint the newspaper account of Mr. Rothschild's advent, which is done on another page. Any real opportunity for starting a profitable new industry in Hawaii should be heralded as widely as possible, and not be allowed to go past unimproved. For some years the Forester has paid no attention to contemporary literature on coconut cultivation, of which much appears in its tropical exchanges, because of the lack of practical interest in the commercial possibilities of the product which has prevailed here. Should, however, the culture be taken up in these Islands upon a businesslike scale, this magazine will be prepared to draw from the experience of other countries with coconut growing, for the benefit of those engaging in the local industry.

Two interesting articles appear in this number under the authorship of Professor Illingworth, of the College of Hawaii. One describes the fruit flies of Fiji, showing how very important it is to keep them out of Hawaii. The other makes the little brown ant out as one of "our good friends," for its services in keeping down the pestiferous house-fly.

Very important information is presented by Mr. G. C. Munro, manager of the Lanai ranch, in this number, relative to kiawe beans and cactus leaves as material for ensilage. Every stock raiser and user in the Territory is interested in this question.

Lands that it would be difficult to put to any other profitable purpose may be utilized for the production of the sources of stock feed mentioned by Mr. Munro. Anything that will reduce the fodder bill of Hawaii, besides increasing the land's capacity for raising stock as ensilage of proved economy and nourishing properties is bound to do, will enhance the general prosperity of the Islands.

All of the divisions of the Board of Agriculture and Forestry make highly interesting reports for November. They are worthy of careful reading and study, and may be commended for such attention to everybody who expects to have anything to do with legislation for the future. There is probably no country, or political subdivision, anywhere which has a more advanced and progressive agricultural and forestry service, in proportion to financial support received, than that of the Territory of Hawaii at the present day.

FRUIT FLIES OF FIJI.

By J. F. ILLINGWORTH, Ph.D.,

Professor of Entomology, College of Hawaii, Honolulu, T. H.

The brief study that I was able to make of the fruit flies of Fiji convinced me of the importance of our quarantine of all vegetable matter, etc., from that region. Since the four species that have been bred out from fruit of those islands all belong to the genus *Dacus*, we can form some idea of their destructiveness. This destructiveness is emphasized since the melon fly (*Dacus cucurbitae*), which was discovered by Mr. Muir to be a native of India, has proved itself such a serious pest here.

The members of this genus all have the same habit of puncturing and depositing their eggs beneath the skin of the fruit. In fruits with a thick rind, like the shaddocks, granadillas, etc., the young maggots are often found for some time in this outer spongy layer; but they eventually work their way in, and destroy all parts of the pulp. As is commonly observed with the melon fly, the maggots have the springing habit, which enables them to escape to some distance from the fruit, before entering the soil to pupate.

It is important to note that, besides the various fruits similarly infested here, the Fijian species attack both pineapples and bananas. If we were so unfortunate as to let these flies get into the Hawaiian Islands, two of our most important crops would receive a serious set-back.

FIJI FRUIT FLY.

Dacus passifloriae Froggatt.

(Proc. Linn. Soc. N. S. Wales, 1911, vol. 35, p. 870.)

This species is a very general feeder, and by far the most abundant of those coming under my observation. I was able to breed them in myriads from shaddocks, granadillas, and guavas. Other citrus fruits—oranges, manderines, lemons, limes, etc.—were but slightly infested.

Observations of particular interest were made upon the manner in which the larvae avoid the attack of ants. These predaceous insects congregated beneath and around each fallen fruit, ready to pounce upon the maggots as they emerged. In most cases the exit holes of the larvae were made on the upper surface of the fruit, and by springing out a foot or more into space, the maggots were able to get into the soil before the ants reached them. Froggatt's original description follows:

Length 9 mm. Head dull yellow; mouth-parts and antennae darker, terminal joint of latter large; arista long, slender; eyes dark red; a lunate dark blotch above the antennae; front unspotted, dull brown; ocelli enclosed in an angular black blotch. Thorax black, no yellow on shoulders, the large angular nude area on mesopleura not reaching the dorsal edge, yellow, scutellum narrow convex, dull yellow; double yellow spot forming a blotch on hypopleura. Wings hyaline, nervures chocolate-brown. Legs light yellow, sometimes clouded at apex of femora, tibia and tarsi. Abdomen black, elongate, oval; in the female the basal segment is broadly rounded, with the anal segments and ovipositor turned down right under the basal portion; sheath of ovipositor large, apex yellow.

Chaetotactic characters.—Head: three pairs of bristles on the front, the first pair longest crossing each other at the tips; the third pair below the ocelli shorter; apex with a pair of stout bristles on either side. Thorax: bristles on front margin short, four on either side, with a pair on the dorsal surface above the scutellum, the latter furnished with a pair on the hind margin.

Hab.—Fiji (W. W. Froggatt; bred from granadilla fruits); (A. Koebele; bred from mangoes); (T. Kirk, from fruit imported into New Zealand).

PINEAPPLE FRUIT FLY.

Dacus (Tephritis) xanthrodes Broun.

(Trans. N. Zeal. Instit., 1904, vol. XXXVII, p. 327.)

The maggots of this species are very similar in habit and appearance to those of the Fiji fruit fly. So much so that, where the two species were found feeding together in shaddocks, I was unable to distinguish between them.

Capt. T. Broun, government entomologist at Auckland, states

in his paper describing the species, that it was first discovered in one pineapple imported from Rarotonga, on the 5th of December, 1903; and on the 14th of that month Mr. G. Harnett, his assistant inspector, and he again detected it in two cases of pineapples from Suva. He also states that it was subsequently found in oranges, granadillas and mammee-apples (papaia) from Tonga and Rarotonga. He remarks that "this new pest threatens to become as troublesome and injurious as the Queensland fly." Capt. Broun's technical description follows:

Imago.—Length of body, $4\frac{1}{2}$ lines; expanse of wings, $7\frac{1}{2}$ lines.

Body elongate, yellow, occasionally testaceous, extremity of abdomen blackish, head sometimes rufescent, tarsi infusate; on the thorax from base to apex there is a central pale ivory-like streak, along each side there is a similar one; these lines after death become less conspicuous.

Head as broad as the thorax, smooth; on its back part there are four black outstanding setae, and between the eyes six finer ones. Antennae normal, their terminal joint elongate and rather darker than the others; at the tip of the preceding one arises a very long seta, which, though stout at its base, becomes very slender and darker towards the extremity. *Eyes* large, prominent, their inner edges straight and moderately distant from each other; they are finely faceted, and of a brilliant purple during life. *Thorax* cylindrical or subovate, nearly twice as long as it is broad, with two slight almost equidistant constrictions at each side; the surface bears numerous minute black granules; from each of these proceeds a fine dark hair; at the base, which is deeply emarginate, there are two long rigid conspicuous black setae directed horizontally backwards; four smaller ones are situated just before the posterior constriction, and about an equal number along each side. *Hind-body* quite the length of the thorax, its basal three segments, irrespective of the narrowed anterior portion of the same length and breadth, thus forming a cylindrical figure fourth segment rather shorter and narrowed behind, the terminal elongate and tapering towards its apex, with very fine grey hairs; the preceding segments are minutely sculptured and bear many dark slender hairs.

Legs stout, moderately elongate with short black hairs; posterior tibiae somewhat arcuate. Tarsi elongate pilose, their basal joint rather more than half of their entire length, fifth bilobed; claws black and rather small.

Halteres yellow, medially slender, clavate and triangular at the extremity.

Wings hyaline, unspotted, with pale-brown nervures corresponding in structure with those of *Tephritis tryoni*.

Underside flavescent, not maculate except at the apex of the last ventral segment, which is picuous. The abdominal seg-

ments are concave or so deeply hollowed that the sides and upper surface appear quite thin.

Male.—*Hind-body* elongate-oval, terminal segment rounded and not prolonged; on each side of the uncovered second segment there is a small cluster of fine black setae; these do not occur in the other sex.

This species differs from Froggatt's *Tephritis psidii* in being larger, differently colored and sculptured, and without dusky areas on the wings. From *T. tryoni* it is distinguished by the greater length of the body and expanse of the wings, uniform coloration, without fuscous or yellow marks, dissimilar clothing and sculpture, less broadly oviform or wasp-like hind-body, and stouter antennal setae. In *T. tryoni* the flanks of the sternum are fuscous.

THE SOUTH SEA GUAVA FLY.

Dacus (Tephritis) psidii Froggatt.

(Agri. Gaz. N. S. Wales, 1899, p. 501, pl. 2, figs. 1-2.)

Froggatt states that the larvae of this species were first found in infested guavas condemned in a shipment from Noumea, New Caledonia. Specimens were later taken in a shipment of granadillas from Fiji. Froggatt's description follows:

This is a medium-sized species, measuring 3 lines in length and about 5 across the expanded wings. The head light-brown, with rich metallic purple eyes; antennae brownish-yellow, the last joint black, long and cylindrical, finely pubescent, the bristle stout and long, with scattered bristles on the face and hind margin of the head; thorax black, with a few fine bristles near the base of the wings, a broad parallel white stripe down the center, with a pale yellow stripe down either side, the humeri a stripe on the sides marked with creamy white; the scutellum large, angular, broadest in front, so broadly margined with creamy white that the center forms a black triangle, a pair of black bristles ornamenting the hind margin; legs brownish-yellow, clothed with fine hairs, tarsal spines and claws black; the wings hyaline, very slightly clouded at the tips; nervures blackish; the transverse cubital nervure clouded on either side with black, giving it a thickened appearance; the apical portion of the second costal, the base of the third costal, and the third basal cell clouded with brown; the abdomen black, elongate, narrow at base, pointed to extremity; the genitalia ochreous; ovipositor consisting of a stout horny pointed process, enclosed in a pale yellow sheath of a granulated structure.

Habitat—New Caledonia and Fiji.

BANANA FRUIT FLY.

Dacus curvipennis Froggatt.

(Rept. on Parasitic and Injurious Insects, Dept. of Agric. N. S. Wales, 1909, p. 93.) Also (Farmers' Bull. No. 24, Dept. of

Agric. N. S. Wales, 1909, p. 28.) Mr. Froggatt describes this species as follows:

This is a handsome, dark yellow and black fruit fly, of medium size, with hyaline wings with the costal margin clouded forming a regular narrow band extending round the tip of the wing; a small V-shaped blotch extends downward from the costal stripe clouding either side of the transverse cross nervure between the first posterior and basal cell, with the usual stripe down the inner side of the wing. Length, 6 mm. Head yellow, eyes purplish-black, antennae fuscous at the tips, bristles black, without black spots on the face; thorax, with the whole of the dorsal surface, covered with a dark shield-shaped black patch, with the center covered with an elongate double bar of silvery white; the shoulders, sides of the body, and scutellum bright yellow, a narrow band or short bar of the same color on the sides of the thorax; the scutellum somewhat elongated when viewed from behind, more convex when viewed from above, with two bristles at the hind margin; a few scattered bristles on the hind margin of the head and the sides of the thorax; legs yellow, thighs of hind legs and tarsi darker; abdomen elongate, with the base and two narrow transverse black bands below, the second broadest on the sides; sheath and ovipositor elongated.

Habitat—Fiji. Bred in Sydney from larvae taken from bananas in shipments of fruit from Suva. Several specimens of both sexes. Type in Agricultural Department's collection, New South Wales.

LITTLE BROWN ANT DOING GOOD WORK IN HAWAII.

By PROF. J. F. ILLINGWORTH, Ph.D.,

Professor of Entomology, College of Hawaii, Honolulu, T. H.

Investigations at the College of Hawaii indicate that the little brown ant (*Pheidole megacephala*) is the principal factor holding house-flies in check under our tropical conditions. It is roughly estimated that fully 75% of the flies are destroyed. I first called attention to the value of this ant as a destroyer of house-flies while carrying on investigations in the Fiji Islands during the past summer.

The remarkable scarcity of house-flies in Fiji indicated that something was effectively destroying them. With all the open refuse-pits which prevail there, one would naturally conclude that these flies would multiply in hordes. In fact, if nothing held them in check in a country with the climatic conditions of Fiji, they would become so abundant that humans would not be able to exist. Recognizing this fact, I suspected that some parasite was preying upon them and began a series of experiments

to discover it. The refuse-pits were found to be very free from maggots, much to my surprise, and later I discovered that this was due to the fact that the little brown ants got most of the eggs and larvae of the flies almost as soon as they were produced. The eggs and newly-hatched maggots of the house-fly are very small, but by very close observation I was able to see the ants carrying them off in myriads. I also found that the ants even attack and destroy the full-grown maggots whenever they appear on the surface of the manure.

In one experiment 200 newly-emerged adult flies were entirely destroyed by the ants, which accidentally found their way into the breeding cage. The attack was only discovered after most of the flies had been dismembered. A few were still in the toils with six or eight ants holding them by wings and legs while others proceeded to cut them to pieces. All of the fragments were finally carried away to the nests of the ants.

While this species of ant is not so abundant here as in Fiji, it is gratifying to know that they have the same fondness for an insect diet. House-flies being one of man's worst enemies, coming from filth on to his food and spreading all sorts of contagion, people in tropical countries are particularly fortunate in having such a check upon their spread. Though the little brown ants are often a nuisance by getting into things which are unprotected, we must give them credit for the good work that they do for us.

As is well known here, ants can easily be kept out of cupboards, etc., by surrounding the legs with tapes wet in an alcoholic solution of corrosive sublimate. This treatment remains effective for a long time unless the tapes become wet or dusted over.

THE KALO IN HAWAII (VI).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

THE CULTURAL REQUIREMENTS OF KALO.

The cultivation of kalo is limited to frostless regions. The corn requires in most cases a full year to mature. Cold weather during that period would be disastrous. As examples of kalos which mature rapidly we may mention the *Apuwai*, the *Mahahá*, and the *Piko-o-ʻwakéa*. In Olowalu, Maui, the strong winds often ruin the growth of the kalo, which has to be pulled before completing its maturity. For this reason the *Apuwai* is preferred, because it gives a good corn in six months. The *Piko-o-ʻwakéa* can also be pulled in six months. In Ewa, Oahu, the *Mahahá* is pulled in five months. In all these cases a more perfect development would be secured by allowing a longer time for growth, but where haste is required the time is not given. The *ohá* or lateral

offspring are always wanting when the corn is pulled too soon. The Chinese commonly pull kalo much earlier than the natives do. As an example of a slow growing kalo we may mention the *Ha'okea*, a wet-land variety which requires from 12 to 16 months to fully develop. If left in the ground a longer time it rots and is unfit to eat.

The climate of Hawaii has many characteristic peculiarities, some of which, as suggested above, directly affect kalo culture. The climate, in general, is distinctly sub-tropic. Cool trade winds and ocean currents reduce the temperature about ten degrees below that of any other part of the world in the same latitude. The prevailing wind is the northeast trade, which blows on an average 260 days in the year.

At ordinary altitudes the maximum summer temperature is rarely above 85° F., and the minimum winter temperature never descends below 50° F. The daily range of temperature averages 13°, seldom exceeding 20°. The average annual temperature for Honolulu is 74°. The highest mountains (8000 to 14,000 feet) are sometimes snowcapped. Cloudiness, rainfall, wind and humidity vary according to situation in relation to the mountain ranges and to altitude. In general there are no sudden changes of temperature, and very slight and seasonal changes. The climate is a warm, bright monotone, without frost, "northers," thunderstorms, hurricanes, or cyclones. The contrast is striking between this equable condition and the bizarre vagaries of the eastern states' weather. "At ordinary elevations the inhabitants of the Territory live practically in the open air the year round, since it is almost never necessary to close windows or seek protection against the weather, except for occasional showers."—Newell.

Considering the small area of the Territory, the variation in rainfall is remarkable. Each island has a windward, cooler, rainy side, where the annual rainfall may amount to 250 inches or over; and a leeward, warmer, arid side, where the annual rainfall may not exceed two or three inches. These figures indicate the extremes, however, and frequent light, local showers are typical of the Hawaiian climate. The average relative humidity is 78%, which is low for the tropics.

"It is popularly supposed that the islands are saturated with moisture. This is because of the fact that at certain points, notably on the windward side, the precipitation is exceeding heavy. * * * Over one-third of the entire land surface of the islands is arid for the greater part of the year. Taking into consideration only the areas which possess a soil of agricultural value, it may be said that one-half of all the good soils of the islands require the artificial application of water to be of the highest value in crop production. Much of the lands now used for grazing can be utilized for crops if water can be had."—Newell.

Two other conditions make irrigation necessary in regions

which do not have a high average monthly rainfall—the physical condition of the soil, which in many places is naturally quite porous; and the high slope of the farm lands, on many plantations averaging 500 feet per mile.

Upland or unirrigated kalo demands at least fifty inches of rain, distributed with fair uniformity throughout the year. Because of this requirement kalo cannot be raised on the leeward slopes of the islands, below 1000 feet elevation, without irrigation. On the windward sides of the larger islands it can be grown, without irrigation, from sea level up to 1500 feet. On many parts of the islands above 1500 feet elevation, the growth is considerably slower, because of the low and variable temperature. Above 4000 feet kalo raising is not practicable.

Necessarily, in order to produce heavy yields per acre, the soil must be very rich. For wet-land cultivation the soil must be capable of being puddled, so that it will hold without seepage the water which is flooded over the field during the greater part of the growing season. According to the natives, regions that are abounding with springs are not suitable for kalo culture, except for the raising of certain wild or inferior varieties.

The soils of Hawaii are composed almost wholly of disintegrated lava rock, and are of recent geologic origin. In the valleys and wooded regions there is a small amount of humus; along certain shores there are lowland plains of coral origin; but aside from these there is no other soil but that derived from lava. In many places one can observe with striking clearness the various stages in the decay of the original lava-flows. As a rule the soils are very deep, this resulting from either decomposition in situ, or long-continued washing from higher levels.

There are three important soil-classes,—lava, tufa, and sedimentary. Under normal climatic conditions the weathering of lava, which contains an exceptionally high percentage of iron, produces a heavy, fertile, *dark-red* soil. Soils of this character usually occur on the leeward slopes of the islands. In regions of heavy rainfall (the windward slopes are thus), incomplete oxidation of the iron compounds in the basalt gives *grayish-yellow* soils. These are usually not as fertile as the red soils, because the excessive rainfall leaches out much of the soluble plant-food.

Tufa, or tuff, has a common source with the basaltic lavas, but differs from them decidedly in many particulars, due to its violent ejection thru the action of steam and gases. Tufa soils are *light-red* or *yellowish*, friable and very porous, and not especially fertile. The sedimentary soils, mentioned above, sometimes contain sufficient humus to be decidedly dark in color. These are the typical “taro-patch” soils, and are used for taro, rice and banana plantations.

All of these soils differ markedly from the usual mainland agricultural soils, and demand special treatment. Physically they

are characterized by a high percentage of exceedingly fine granules; in some places this fineness comparing with that of precipitated chalk, being an almost impalpable powder. The more granular types are known as "shotty soils." Most of the soils become quite sticky when wet, but readily disintegrate upon drying.

Iron and manganese are often so abundant that the soil containing them resembles a low-grade ore in composition. In general the soils are characteristically acid, with high percentages of iron (15%-60%), and nitrogen. The average nitrogen content exceeds 0.3%, or six tons per acre-foot. Most of the soils are also rich in phosphoric acid and potash, but these are not always in available forms. The soils are, in general, exceedingly fertile, due partly to the abundant store of plant-food in them, and to the relatively short period in which they have been subjected to leaching.

Hawaiian soils respond quickly to the application of fertilizers, and like all other new soils improve rapidly under rational cultivation. Many of the soils are deficient in lime, but this is easily supplied in the form of coral sand, an excellent form for soil improvement. Dr. Wilcox, special agent in charge of the Federal Experiment Station in Honolulu, says: "When plowed deeply our soils are exceedingly retentive of moisture, as evidenced by the fact that cotton and various other plants thrive in a wind condition where no rain falls except once or twice per year, and then only to the extent of one or two inches. Moreover, good crops of alfalfa and forty bushels of corn per year have been produced with two inches of rainfall without irrigation. One of the most important points in soil cultivation, which has been demonstrated by the sugar planters, is the great value of deep plowing. Some of our soils are commonly plowed to a depth of two or three feet, and are thus put in condition to hold and store the rainfall, for the benefit of the crop. The soils are easily kept in good tilth and great fertility by deep plowing, suitable crop rotation, and the application of fertilizers to replace special elements of plant-food removed by the crops."

The desirable conditions, specified above, find their best and most complete development, in Hawaii, in valley floors or bottoms. The mouths of the valleys are especially adapted to kalo farming. There the valleys widen, giving broad stretches of low-lying land. The kalo lands in such valleys as Manoa and Kalihi, on Oahu, have doubtless been cultivated continuously for a period of several hundred years. In former times the *loi* were situated chiefly in the middle and upper portions of the valleys. "The development of artesian wells on Oahu in 1879," according to Sedgwick, "made it possible to throw open greater low-land areas to taro culture." As a matter of fact, this land was utilized mainly for rice. This soil is fertile mountain wash, fine textured and very deep.

The Hawaiian designated by the word *au* all places where *kalo* is cultivated, and by *kaha* those places where *kalo* was not or could not be grown, the people of such a region depending upon another place. For example, the natives in Kona formerly shipped *pa'i-ai* to the barren region extending from Kailua northward to Kohala. In this region *kalo* could not easily be raised, and the locality was known as *Kekaha*. There were, however, excellent fishing places along the *Kekaha* coast, so the natives of *Kekaha* bartered fish in exchange for the Kona *pa'i-ai*. In connection with this traffic there arose the remarkable story of *Ka-ai-pa'i*, a mythical shark god. This monster lived in the sea near Kona, and any person guilty of *heʻewa* (non-fulfillment of sacred vows), sailing along the Kona coast, was in great danger of having his canoe, laden with food, overturned by the angered shark-god, who would consume the *pa'i-ai* of the offender.

Kalo seems to be able to resist a certain amount of exposure to sea breezes, for it may be seen growing unharmed in places where sugar cane is injured by the salt wind-driven spray.

(*To be continued.*)

TWO GOOD ENSILAGE MATERIALS.

To the Editor of the Hawaiian Forester and Agriculturist.

Dear Sir:—It may interest some of your readers, especially ranchers in dry sections, to know that the kiawe bean cures well as ensilage. The seeds are softened in the process and become readily available as food. In this way the beans can be stored for years with no danger of deterioration from weevils eating out the seed, and so destroying a large proportion of the food value, as happens with dry-stored beans.

The cured bean is readily eaten by stock. The trial in this instance was made with a limited amount of beans buried in a grass ensilage pit, and, as the beans cured well and the other material did not, it is evident that the beans would cure well alone.

The common spiny cactus also cured well in alternate layers with grass and weeds. Perhaps too watery to cure well by itself, its juices helped to cure the surrounding material, which in this instance was in too dry condition for good ensilage. The cactus slabs press out thin, and the thorns almost disappear, and it has been found in Australia that stock eat it as they do other ensilage.

Immense quantities of this class of ensilage could be preserved in pits on some Hawaiian ranches, at a moderate cost, during a run of wet years, and much reduce the losses of stock in drought seasons.

With the present prospect of profit in producing beef, anything that will increase the carrying capacity of the land is of value.

Yours truly,

G. C. MUNRO.

Lanai, December 12, 1913.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, November 30, 1913.

Hon. W. M. Giffard,

President, Board of Agriculture and Forestry.

Dear Sir:—Reporting on the work of the Division of Animal Industry for the past month, I beg to say that the fourth annual test of the dairy cattle of the City and County of Honolulu has been finished, a detailed account of the same being submitted in the appended report of the assistant territorial veterinarian.

From this it will be seen that while it cannot be claimed that bovine tuberculosis has been entirely eradicated, it must be granted that the infection has been reduced to a minimum unattained in any other community of similar size and composition, and during the comparatively short period of four years. In certain sections of Europe, notably in Denmark, bovine tuberculosis has been eradicated in a number of counties or communities by means of the Bang method, so named after its originator, Prof. B. Bang of the Royal Veterinary College of Copenhagen, and which consists in the absolute segregation, on the same farm, of healthy from tuberculous (reacting) animals, only those clinically affected being destroyed, the apparently sound reactors being continued for dairy and breeding purposes until they develop clinical symptoms or until the milk is proved to contain tubercle bacilli. In the meantime the milk from the reacting animals is carefully pasteurized, whether for human consumption as milk, butter or cheese, or for the raising of the calves, the latter being removed from their mothers immediately after birth. This method is exceedingly slow and very expensive as it requires the establishment of two entirely separate dairies, as well as separate dairy attendants, and can only be applied to advantage where the question is to preserve a valuable breed or strain of dairy cattle which could not otherwise be replaced. In some cases it has taken from 15 to 20 years to rid a large estate of the disease, the infection, in spite of every precaution, being transmitted repeatedly from the diseased to the healthy herd. It will therefore be seen that while the method obviates the immediate destruction of all reactors, it is so expensive and so uncertain as to be resorted to only in the case of valuable animals, or families, which perhaps have been developed only by means of careful selection and systematic breeding through numerous generations.

The only other case available for comparison is that of the District of Columbia, where the federal Bureau of Animal Industry, in 1909, decided to investigate the prevalence of bovine tuberculosis for the purpose of demonstrating the feasibility of the control and, ultimately, the eradication of the disease from a given territory. To quote from the Year Book of the Department of Agriculture for 1912, referring to the above mentioned case, we read:

"In the first complete testing of the district cattle a total of 1701 cattle were tested, of which 321, or 18.37 per cent., were tuberculous. A systematic retesting has reduced the percentage to 1.29, and in the meantime the testing of cattle entering from other states has prevented the introduction of diseased animals."

And in another place we read:

"These tests were applied only to cattle whose owners signed an agreement with the Bureau providing for the slaughter or effective quarantine of reactors, the tuberculin testing of animals added to the herd, the disinfection of infected premises, and the observation of proper sanitary measures. This work has grown in popularity until in 1912 cattle tested numbered 8433, of which 769 were reactors or suspects. The percentage of tuberculosis now being found by retests in this territory has thus far been reduced to 2.30 per cent."

As compared with these results it must be granted that the reduction in number of infected herds in the City and County of Honolulu from more than 90 per cent. to less than 2 per cent., and of infected animals from 23.98 per cent. to 2.5 per cent., is very creditable, especially when it is considered that the District of Columbia work was performed under ideal conditions, not less than six veterinarians being employed in the testing and the owners being indemnified to within twelve dollars of the appraised value of the reacting animals. The cost to the Bureau of the first test alone, occupying a period of a little more than four months, amounted to \$9270.05, divided as follows:

| | |
|---|-----------|
| Salaries | \$3275.00 |
| Travel | 615.48 |
| Hypodermic syringes, etc. | 95.01 |
| <hr/> | |
| Total expenses, testing and tagging | \$3985.49 |
| Cost to Bureau of reimbursing owners | 4264.02 |
| Salaries and traveling expenses in connection with disinfection of premises | 1020.54 |
| <hr/> | |
| Total expenses to Bureau | \$9270.05 |

Leaving out the cost of indemnifying the owners we find that the testing of 1701 animals on 356 premises, of which 319 cattle were found to react, on 102 premises, all of which were disinfected, the cost of the work done amounts to \$5006.03 or very closely to \$3 per head. These are, as stated, the figures obtained from the Year Book of the Department of Agriculture for the years 1910 and 1912. Let us compare them with the approximate figures for testing the dairy herds in the City and County of Honolulu for the period of 1910-1913, inclusive.

To determine exactly what part of the official working hours and, consequently, what part of the salaries of the officers and employees of the Division of Animal Industry of the Board should

be accredited to this specific branch of work is rather difficult, but it is safe to say that, while the first test (1910), during which the old subcutaneous method was employed, the territorial veterinarian gave much of his time to the work while it lasted (3 months), the subsequent tests have been performed by the assistant territorial veterinarian with a livestock inspector, or, later on, with the municipal milk inspector assisting him, at the outermost one-quarter of the time of the territorial veterinarian and one-third of the time of the assistant territorial veterinarian can possibly be charged against this work. To this should be added the entire time of the livestock inspector while the testing was in progress (Mr. Vanhuisen during the 1910 test, his time being otherwise given to the control and eradication of glanders, and later on Mr. Richards, who, as municipal milk inspector, was assigned to assist in the testing, his salary being paid by the Board of Supervisors up to February 1, 1913), from which we reach the following figures, *for the past four years*:

Salaries—

| | | |
|---|-------------|--------|
| Territorial veterinarian, one-fourth of each year | \$3000.... | \$3000 |
| Assistant Ter. veterinarian, one-fourth for 1911 | \$1800.... | 450 |
| Assistant Ter. veterinarian, one-third for 1912 | \$2100..... | 700 |
| Assistant Ter. veterinarian, one-third for 1913 | \$2400..... | 800 |
| Livestock inspector, Vanhuisen..... | | 400 |
| Livestock inspector, Richards..... | | 600 |

Total salaries\$5950

Transportation—

| | |
|---|--------|
| Automobile, deterioration (50 per cent.)..... | \$1100 |
| Automobile repairs, tires, gasoline, oil..... | 2000 |

Total 3100

Incidentals—

| | |
|--|-----|
| Traveling expenses, tags, hypodermic syringes, thermometers, etc. | 600 |
|--|-----|

Grand total\$9650

With the expenditure of this sum more than 17,000 tuberculin tests have been applied, making the average cost a little less than 37 cents per test, while at the same time nearly 1100 head of tuberculous animals have been eliminated from the dairy herds of Honolulu, all of which, with the exception of a small number now awaiting slaughter, have been killed.

This means that to our knowledge there are today no untested nor any reacting animals producing milk for human consumption in the City and County of Honolulu. The few, less than thirty head, of reactors still alive are effectively segregated and all branded, the latter preventing the sale or other disposition for any purpose except immediate slaughter. What is left to be de-

sired, however, is the effective disinfection of all infected premises, to accomplish which it will be necessary to obtain the coöperation of the territorial Board of Health. This will undoubtedly be granted if application is made through the proper channels. In the meantime it is not to be concluded that bovine tuberculosis is eradicated or that there is so little left as to make it a negligible quantity. The work must be continued for at least two or three years more, if not longer, and no permit to sell milk should be granted without an official guaranty that no untested or reacting animals more than six months old, remain on the dairy premises or their immediate surroundings. In this connection it should be borne in mind that the local milk producers have voluntarily sacrificed more than 1100 head of dairy cattle, without protest and without any claim for indemnification, even though the last legislature recognized the right of the owners of banana plants to indemnification when the same were destroyed for the good of the community. It would, therefore, seem unwise at the present time to make any change in the regulations now in force and which assure the milk producers of the tuberculin testing of their cattle free of cost, while the health of all dairy animals should be made a matter of official recognition and supervision, not alone as regards tuberculosis but every other disease or ailment which in any way might influence or reduce the wholesomeness of the milk. This would mean granting the dairymen the right to call an official veterinarian whenever anything was the matter with any of his milk producing cows, free of cost, but on condition that he agrees to follow the veterinarian's instructions in regard to the disposition of the milk from the sick animal. The dairyman should, in fact, be encouraged to watch and promote the health of his animals instead of, as proposed, making it a compulsory matter of expense to obtain professional advice when told to do so by an unprofessional officer or inspector. In conclusion I beg again to call the Board's attention to the recommendations of the Milk Committee of 1910, to wit: "That the control of milk be taken from the municipality and be given to the territorial Board of Agriculture and Forestry in order to secure protection for the entire Territory;" and that of the Sanitary Commission of 1911, to wit: "That a heavy fine be imposed on any person convicted of selling milk from cows infected with tuberculosis."

Very respectfully,

VICTOR A. NORGAARD,
Territorial Veterinarian.

REPORT OF ASSISTANT TERRITORIAL VETERINARIAN.

Honolulu, November 30, 1913.

Dr. V. A. Nørgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith a report on the work accomplished during the month of November, 1913.

Tuberculosis Control.

During the past month 1267 head of cattle were subjected to the test with the result that 1256 head of cattle were passed and 11 condemned and branded. With the exception of 35 head, which will be tested on Saturday, December 6, the fourth annual test of the dairies of the City and County of Honolulu is complete. The following tabulated list gives the names of the dairies with the number of cows tested, passed and condemned in each:

| <i>Dairy.</i> | <i>Tested.</i> | <i>Passed.</i> | <i>Condemned.</i> |
|--------------------------|----------------|----------------|-------------------|
| P. M. Pond..... | 380 | 370 | 10 |
| M. M. Pedro..... | 34 | 34 | 0 |
| R. A. Branco..... | 20 | 20 | 0 |
| Waialae Dairy | 571 | 558 | 13 |
| K. Inouye | 14 | 14 | 0 |
| T. F. Farm..... | 73 | 68 | 5 |
| M. Riedell | 9 | 9 | 0 |
| Kawaiahao Seminary | 18 | 18 | 0 |
| Oahu College | 15 | 15 | 0 |
| Geo. Wond | 33 | 33 | 0 |
| J. M. Whitney..... | 13 | 12 | 1 |
| P. Miyakawa | 15 | 15 | 0 |
| F. Medeiros | 20 | 20 | 0 |
| F. Andrade | 94 | 94 | 0 |
| H. E. Cooper..... | 19 | 19 | 0 |
| I. Naoaki | 22 | 21 | 1 |
| J. H. Cummings..... | 7 | 7 | 0 |
| S. T. Grace..... | 7 | 7 | 0 |
| C. K. Quinn..... | 5 | 5 | 0 |
| M. Kawamura | 5 | 5 | 0 |
| M. K. Young..... | 15 | 15 | 0 |
| S. Tsumoto | 10 | 10 | 0 |
| M. Quintal | 5 | 5 | 0 |
| M. Robinson | 6 | 6 | 0 |
| Nishimoto | 10 | 10 | 0 |
| D. Tello | 2 | 2 | 0 |
| Kamehameha Schools | 40 | 39 | 1 |
| C. J. Day..... | 3 | 3 | 0 |
| F. Correa | 13 | 13 | 0 |
| J. Mendonca | 14 | 14 | 0 |

| <i>Dairy.</i> | <i>Tested.</i> | <i>Passed.</i> | <i>Condemned.</i> |
|----------------------------|----------------|----------------|-------------------|
| Geo. Holt | 38 | 34 | 4 |
| S. I. Shaw..... | 22 | 22 | 0 |
| Alex. Young Dairy..... | 39 | 35 | 4 |
| R. Davison | 4 | 4 | 0 |
| S. M. Damon..... | 343 | 337 | 6 |
| I. Moriako | 16 | 15 | 1 |
| S. Boyama | 9 | 9 | 0 |
| T. Nakamura | 4 | 4 | 0 |
| W. E. Wall..... | 14 | 13 | 1 |
| C. Bellina | 230 | 208 | 22 |
| E. C. Smith..... | 8 | 8 | 0 |
| F. Johnson | 7 | 7 | 0 |
| S. Tado | 10 | 10 | 0 |
| J. Schwank | 7 | 7 | 0 |
| J. Gouveia | 50 | 49 | 1 |
| O. R. & L. Co..... | 1428 | 1416 | 12 |
| Waialea School | 43 | 43 | 0 |
| Laie Plantation | 21 | 21 | 0 |
| Salvation Army Home..... | 4 | 4 | 0 |
| S. Isuda | 7 | 7 | 0 |
| Waianae Plantation | 130 | 122 | 8 |
| W. P. Louis..... | 14 | 14 | 0 |
| W. P. Alexander..... | 5 | 5 | 0 |
| Chas. Frazier | 3 | 3 | 0 |
| R. Compos | 83 | 76 | 7 |
| C. Lucas | 85 | 78 | 7 |
| Jose Gonzalles | 35 | 33 | 2 |
| Frank Gomes | 47 | 47 | 0 |
| K. Yamashita | 17 | 17 | 0 |
| S. Niarato | 20 | 20 | 0 |
| College of Hawaii..... | 19 | 17 | 2 |
| F. Paeple | 5 | 5 | 0 |
| Y. Ogawa | 5 | 5 | 0 |
| J. A. Templeton..... | 39 | 39 | 0 |
| Waimanalo Plantation | 23 | 23 | 0 |
| J. Fernandez | 8 | 8 | 0 |
| J. W. McGuire..... | 20 | 19 | 1 |
| Fred L. Makino..... | 3 | 2 | 1 |
| Lunalilo Home | 15 | 15 | 0 |
| Carl Waldeyer | 4 | 4 | 0 |
| B. Salina | 30 | 28 | 2 |
| | <hr/> 4406 | <hr/> 4294 | <hr/> 112 |

From the above tabulated list it will be seen that 71 dairies have been visited and a total of 4406 head of dairy cattle subjected to the tuberculin test with the result that 4294 head have been passed and tagged and 112 condemned and branded, giving

a percentage of 2.5% of tuberculous cattle which have been eliminated from the dairy herds.

Importations of Livestock.

Nov. 3—S. S. China, Orient: 1 black Chow pup, McDuffie.

Nov. 4—S. S. Honolulan, San Francisco: 1 Dutch belted bull, 1 Dutch belted cow, 2 Dutch belted heifers, Mrs. B. H. Allen; 1 Boston bull pup, Mrs. McWayne; 1 cat, 22 crates poultry.

Nov. 5—S. S. Niagara, Colonies: 4 ponies, 9 dogs, 4 monkeys, 1 cat, Chas. W. Schepp, vaudeville show. (Clean bill of health from Colonial authorities covering six months quarantine and so were allowed entrance here free from restrictions.)

Nov. 5—S. S. Shinyo Maru, San Francisco: 1 dog (quarantined 19 days). Van Vetzer.

Nov. 6—S. S. Chiyo Maru, Orient: 1 crate Japanese games, S. de Freest.

Nov. 10—S. S. Sierra, San Francisco: 20 crates poultry.

Nov. 18—S. S. Lurline, San Francisco: 5 black Percheron horses, A. W. Carter; 1 horse, Lieut. A. K. B. Lyman; 7 Berkshire hogs, Club Stables; 35 crates poultry, 1 dog, J. H. Meyers, Kilauea, Kauai.

Nov. 24—S. S. Sonoma, San Francisco: 1 collie dog, Father Chas. Windels.

Nov. 25—S. S. Wilhelmina, San Francisco: 29 crates poultry, 1 dog, W. F. Heilbron.

Respectfully submitted,

LEONARD N. CASE,
Assistant Territorial Veterinarian.

DIVISION OF ENTOMOLOGY.

Honolulu, November 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of November, as follows:

During the month 37 vessels arrived at the Port of Honolulu, of which 25 carried vegetable matter and one vessel moulding sand.

| <i>Disposal</i> | <i>Lots</i> | <i>Parcels</i> |
|--------------------------------|-------------|----------------|
| Passed as free from pests..... | 392 | 24,739 |
| Fumigated | 11 | 36 |
| Burned | 63 | 75 |
| Total inspected | 466 | 24,850 |

Of these shipments 24,587 packages arrived by freight, 127 packages by mail and 136 packages as baggage of passengers and immigrants.

Rice.

During the month 24,321 bags of rice arrived from Japan, all of which was marked "new crop" and all of which was found free from pests and was released for delivery.

Pests Intercepted.

Sixty-six packages of fruit and 8 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were as usual seized and destroyed by burning. Among these were found two lots of chestnuts from Yokohama infested with the chestnut weevil (*Balanus species*).

A potted plant (*Ardisia crenulata*) was badly infested with the brown scale (*Coccus hemisphaericum*). Five boxes of Florida oranges arrived via Seattle which were badly infested with our common purple scale. The oranges had been fumigated as all of the scale was dead. I notified the shippers about the condition of the fruit and advised them not to ship any more in such condition to the Territory.

An *Anomala* grub was found in soil around the roots of an azalea plant in a plant shipment from Japan.

Hilo Inspection.

Brother M. Newell at Hilo reports the arrival of six steamers during the month. Of these five carried vegetable matter consisting of 251 lots and 4172 packages. One hundred and eighty-eight boxes of apples, bearing no label and infested with codlingmoth—in fact most inferior stuff—were returned to the Coast. The Japanese steamer Sayo Maru called at Hilo on its way to South American ports and unloaded 6457 bags of rice and 110 bags of beans, all of which were found free from pests and passed.

Inter-Island Inspection.

During the month of November 51 steamers were attended to and the following shipments were passed:

| | |
|-----------------------------|-----------|
| Plants | 118 pkgs. |
| Taro | 929 bags |
| Taro tops | 143 " |
| Pineapple suckers | 364 " |
| Fruit | 20 pkgs. |
| Vegetables | 39 " |

Total passed 1613 pkgs.

The following packages were refused shipment—infested with pests and soil attached to roots:

| | | |
|-------------------------|----|-------|
| Plants | 10 | pks. |
| Fruit | 6 | " |
| Vegetables | 1 | " |
| | | <hr/> |
| Total refused | 17 | " |

Respectfully submitted,

E. M. EHRHORN,
Superintendent of Entomology.

DIVISION OF FORESTRY.

Honolulu, November 29, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows, the routine report of the Division of Forestry for the month of November, 1913:

During the early part of the month I prepared for the use of the Board a comprehensive report on forest conditions on the Island of Hawaii, in part the result of a trip made during October. During November I have also got ready several statements and memoranda dealing with forest work, for reference by members of the Board.

Visit to Waialua.

On November 5, I made a general inspection of the tree planting work now in progress on Waialua plantation, Oahu, visiting, in company with the manager, Mr. W. W. Goodale, the various groves and blocks of trees that have been set out within the past few years. The use of rough or waste land for tree planting is without any question good business. What has been done at Waialua is a good example of what should be practiced on similar land all over the Territory. When the price of imported timbers goes up and even fuel wood gets scarcer than it is today, those corporations that have areas of planted forest will think gratefully of the men to whose foresight the tree planting was due.

Arbor Day.

Friday, November 14, having been designated by the Acting Governor as "Arbor and Conservation Day," was generally observed in the schools throughout the Territory. In Honolulu members of the "Outdoor Circle"—the organization of ladies that has of late taken so much interest in street tree planting—took

part in the exercises at several of the schools. In at least one or two cases the local improvement association was also represented. At the request of the principal, Mr. I. M. Cox, I said a few words at the Kalihiwaena school.

As usual there was a general free distribution of trees from the Government Nursery. In the afternoon 443 school children each received a tree as they passed through the grounds. Nearly four thousand trees were sent out for school ground planting, and almost twice as many more to the homesteaders and other individual applicants. A special attempt was made to give the homesteaders in some of the recently opened tracts the chance to get free trees. The offer was well taken up and good-sized consignments went to Haiku, Maui, and to Kapaa, Kauai. In all 11,691 trees were given out on Arbor Day from Honolulu. But this is not the total distribution, for it does not include those given away at the sub-nurseries at Hilo, Hawaii, and at Homestead, Kauai.

Trip to Maui.

From November 19 to 22 I accompanied the President of the Board on a trip to the Kula District on Maui to look into forest matters that await action before the Board of Commissioners. During the remainder of the month I have been in Honolulu, occupied with routine work.

Seed Introductions.

There have recently been received from Mr. Joseph F. Rock, consulting botanist of the Board of Agriculture and Forestry, consignments of forest tree seeds from the Philippines, where he had stopped for a time en route to Europe. Some of the seed sent is from trees never before tried in Hawaii. It is being given special care in the nursery. When large enough to plant out the seedlings will be planted in carefully selected places where they can be watched and studied.

Routine Work at the Nursery.

The regular routine work at the Government Nursery goes on as usual. Mr. Haughs' report, transmitted herewith, gives the details of what has been accomplished the past month.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, November 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the work done during the month of November, 1913.

Nursery.

From November 1 to 15 the men employed at the nursery, including the two seed collectors and wagon men, were kept busy packing up and sending out trees for Arbor Day planting. The total number of trees distributed amounted to 11,691. The attached table gives the number of applications received from the principals of the schools on the different islands, also from Honolulu and from others. The number of trees ordered for each island is also recorded.

Distribution of Plants Since Arbor Day.

| In seed boxes | Pot Grown | Total |
|---------------|-----------|-------|
| 2000 | 55 | 2055 |
| .... | 525 | 525 |
| <hr/> | <hr/> | <hr/> |
| 2000 | 580 | 2580 |

Collections.

| | |
|--|----------------|
| Collections on account of plants sold amounted to..... | \$ 2 55 |
| Rent of building, nursery grounds for September and October, 1913 | 70 00 |
| Total | <hr/> \$ 72 55 |

Plantation Companies and Other Corporations.

Under the above heading we received orders and shipped the following trees:

| | |
|--------------------------|--------------|
| Trees in seed boxes..... | 8,000 |
| In transplant boxes..... | 7,350 |
| Pot grown | 250 |
| Total | <hr/> 15,600 |

On November 24, in company with Mr. Van Valkenberg, the writer made a visit to the Kunia Development Company's lands at Upper Honouliuli for the purpose of examining the tree planting that is being done by the company. The splendid results obtained and the remarkable, rapid growth which the trees are

making are, there is no doubt, due principally to the great care that has been given the land in the way of plowing and cultivating. A number of varieties of eucalyptus have been planted, the species that have done the best being *E. Globulus*, *E. Citriodora*, *E. Corynocalyx*, and *E. Pilularis*. The outlook is certainly very encouraging and the company is to be congratulated on the splendid showing that is being made.

We have just received from the Honorable W. R. Castle, 10 pounds of koa seed collected in Kona and presented by him to this Board. Owing to the great difficulty we are having in procuring koa seed this gift is certainly very acceptable and we are very much obliged to Mr. Castle for it.

Makiki Station.

The men at the station have been doing the regular routine work. Owing to the large number of trees sent out for Arbor Day planting and for other purposes, the stock both at the main nursery and at this station has been considerably reduced and we will be busy for some time to come in replenishing it.

Honolulu Watershed Planting.

The work done on the face of Round Top has been principally clearing off and making holes for trees. Koa trees to the number of 649 were planted during the month. The ground is now in good condition for planting and we intend filling all the holes that are ready with koa trees.

U. S. Experimental Planting, Nuuanu Valley.

The man employed to plant and take care of the trees has been kept busy attending to the plants in the nursery, also hoeing the trees that require it.

Respectfully submitted,

DAVID HAUGHS,
Forest Nurseryman.

DIVISION OF HYDROGRAPHY.

December 8, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of November, 1913, is submitted:

Special Kona, Hawaii, Investigation.

The field surveys and investigations in Kona were completed on November 30 by Howard Kimble, assistant engineer. Routine

field work in the nature of rainfall observations, and the operation of a clock register steam gaging station on the Kiilae stream, will be continued at least through the calendar year 1914. Fifteen monthly rain gages will be read, part by an employee of the Bishop Estate, gratis; and part by a gage reader employed by this division. The records from these stations, combined with those from stations maintained by private persons, should give sufficient data to furnish a good approximation of the relative precipitation over the entire Kona districts.

All maps, data, etc., will be assembled as nearly as possible during December, but the completed report and recommendations will not be furnished until the rainfall and run-off records of 1914 have been studied and considered.

From November 10 to 14 the undersigned, accompanied by Mr. T. F. Sedgwick, underground water expert, made an inspection trip over a part of North and South Kona. Mr. Sedgwick examined the underground possibilities of water and will submit a report relative thereto.

Heavy Precipitation.

Heavy rainfall has been reported from all islands, and the serious conditions of drought a few months past have been changed to conditions of a superabundance of water which has done considerable damage to fields, roads, bridges, etc. Records received from high level rainfall stations as a rule show the heaviest precipitation in the past two years.

At the intake of the Wahiawa Water Company's ditch on the headwaters of the north fork of the Kaukonahua stream 39.6 inches fell between November 1 and 25, while over 33 inches were recorded during the month in the upper Nuuanu valley. Extreme floods occurred all over Oahu on the night of November 20. On the south fork of the Kaukonahua stream the new masonry diversion dam of the water supply system of Schofield Barracks was destroyed by an extreme flood which, according to the cooperative gaging station maintained by the U. S. Army and this division, totaled more than one thousand cubic feet per second. At Keanae, Maui, 43.5 inches of rain fell during the month. On all islands the construction work was delayed by floods.

Kauai.

Mr. W. V. Hardy, field assistant, assisted by Mr. D. E. Horner, field assistant, completed trails from the present power line trail to the new Stevens clock register gaging station sites located at an elevation of 700 feet on the Hanalei and Kalihiwai streams. The materials for these stations were also packed into the station sites on men's backs. This work was done under hard conditions as both streams were in flood most of the time. Five stream measurements were made and three rain gaging stations were

visited. Mr. Hardy spent 27½ days in the field and Mr. Horner 23 days. Heavy rainfall made trails and roads almost impassable during the month.

Oahu.

On November 4, 7, and 25 to 29 the undersigned made reconnaissances of streams in the Kaneohe, Heeia, Kahana, Punaluu, Kaluanui, Kaipapau, Laie and Malae Kahana valleys on windward Oahu. It is estimated that sixteen stream gaging stations will be established in these basins during the calendar year 1914. Coöperation has been promised by the Heeia Agriculture Company and the Kahuku Plantation Company. Nineteen stream measurements were made and five rain gaging stations were visited by Mr. J. C. Dort, office engineer, and Mr. G. R. White, field assistant. From November 24 to 31 Mr. White constructed new weirs on the Makawao ditch, the Pohakea and Kahanaiki streams, built foot bridges for flood measurements on the Makawao and Kaimi streams, and improved the cross sections of all stations in the Kailua and Kahanaiki valleys by removing boulders and other obstructions.

Maui.

On Maui Mr. C. T. Bailey, assistant engineer, in charge, assisted by Mr. E. O. Christiansen, assistant engineer, made 29 stream gaging measurements. Construction work on the new clock register stations on East Maui was delayed by floods. The station on the Honomanu was completed, and most of the "above water" construction was finished on the Wailuanui, West Wailuaiki, East Wailuaiki, and East Kopiliula streams.

Very respectfully,

G. K. LARRISON,
Superintendent of Hydrography.

SUGGESTED COCONUT INDUSTRY.

(Honolulu Star-Bulletin, November 19.)

The long dormant undertaking of coconut raising in the Hawaiian Islands as an industry bids fair to be revived if the present plans of Alexander Z. Rothschild, a prominent manufacturer of San Francisco, who arrived in Honolulu in the *Siberia* Monday evening, materialize. The utilization of the husk of the coconut forms the basis of a new industry the investigation of which has called Mr. Rothschild to this city, and although he is not now ready to give out what this new industry involves, or what products will be derived from it, he intimates that he is backed up by sufficient capital to start a factory here in case he can come to favorable terms with persons who would be willing to enter into the business of growing the nuts.

"My visit is simply one of investigation," said Mr. Rothschild when seen this morning. "I believe that there is a wide field to encourage the growing of coconuts here in Hawaii, as I have a patented process for utilizing the husk of the nut, and, if I can come to agreements where I may be assured of being supplied with all the coconuts which I desire in the business, I intend starting a manufacturing plant here in Honolulu which will turn out this product. I am a member of a company which is looking into the matter; not only here, but in the Philippines and in other places. This company is capitalized at a large amount, and in case this factory would be started, no local money would be taken into the proposition. The manufacture of this product is not a new one, but will be new to these Islands."

Mr. Rothschild said that at this time he did not care to give out any information as to just what this product is which he intends deriving from the husk of the coconut, saying that all this would come out later in case he can interest small farmers and others in growing the nuts.

"If I could secure a million nuts today, I would immediately go about establishing a factory. The only drawback now is to get the farmers interested in the growing so that, should we start the factory, we could be assured of a constant supply of material. I intend visiting on Oahu and on the other islands during my stay here, and from Honolulu I shall go to the Philippines and make a like investigation there.

"I believe that if my plans are carried through, as well as those of the company, it will result in the formation of a new, paying industry for the Hawaiian Islands. The factory which we would establish would be able to make use of all the coconuts obtainable and for an indefinite length of time. With regard to securing the nuts, our plan would be to contract for them while on the trees for periods of a year or more. Here is a splendid chance for the small farmer as well as the large farmer, for the prices which we would pay for the nuts would be well worth their growing."

COLLEGE IMPROVING CORN CULTURE.

(*Honolulu Star-Bulletin*, November 19.)

The College of Hawaii in its course in "crop improvement" is developing superior strains of five standard varieties of field corn suited to Hawaiian conditions.

The main object sought after in the experimental breeding work thus far undertaken is to develop high yielding strains of uniform quality. The work done by the agricultural students at the college farm in Manoa during the past year has given results that are highly noteworthy. Some of the actual yields are exceeding 90 bushels per acre, with an average of about 70 bushels

per acre as an average for all varieties tested. These are record yields and show the value of thoroughbred seed stocks which are now being developed with the same care as is thoroughbred live stock.

Beginning December 1 the College of Hawaii offers for free distribution to all who will agree to report upon the results of their experimental plantings, two pounds of seed of each of the following four varieties. It requires about eight pounds of seed to plant an acre, so that the seed allotted to each applicant will be sufficient to plant a fourth acre of each of four varieties.

Reid's Yellow Dent.—The standard yellow dent corn of the great corn belt. Bright golden yellow, red cobs with medium-sized kernels, shelling 85 to 90 per cent. of grain. Matures in about 110 days from early spring planting at College of Hawaii farm.

Boone County White.—Pure white, large ears and deep medium-rough kernels. Produces a high percentage of shelled corn. Requires about 120 days to mature.

Funk's Ninety-day Yellow Dent.—One of the earliest maturing yellow dent corns. Ears small to medium (averaging seven to eight inches in length, eight to ten ounces in weight). A strain of this variety yielded at the rate of 91 bushels per acre at the college farm during the past season, where it matured in less than 100 days. Owing to its early maturity this variety will probably prove itself well suited to locations of low rainfall.

Silver Mine.—An early maturing white dent corn. The kernel is deep and broad, giving a vigorous germ. Shells as high as 88 per cent. of grain. Matures in about 100 days.

This is a noteworthy advance in the local production of high-grade corn, and is engaging the attention, not only of small planters, but also of the large plantation managements.

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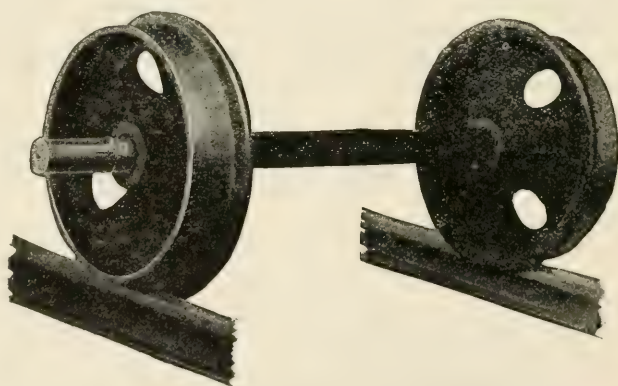
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